

Third

R E P O R T

OF

The Belfast Naturalists' Field Club,

1865-66.



S.15. A.

BELFAST
K.
Naturalists' Field Club.

ESTABLISHED MARCH, 1863.

Third
THE ANNUAL REPORT

AND

Statement of Accounts,

WITH

A LIST OF THE MEMBERS FOR THE YEAR
ENDING 31ST MARCH, 1866,

AND

OFFICERS FOR THE YEAR 1866-67.

BELFAST :
PRINTED AT THE DAILY "NORTHERN WHIG" OFFICE,
CALENDER STREET.

1866.



RULES OF THE CLUB.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the objects of the Society be the practical study of Natural Science and Archæology.

III.

That the officers of the Club be a Committee of twelve members, a Treasurer, and two Secretaries. The Committee, on their first meeting, will appoint a Chairman to preside at their meetings.

IV.

That every candidate for membership shall be proposed and seconded at any meeting, and, on paying the subscription, become a member.

V.

That the subscription be five shillings per annum, payable in advance.

VI.

That the members of the Club shall hold at least six field meetings during the year, in the most interesting localities, for investigating the Natural History of the district. That the place of meeting be fixed by the Committee, and that eight days' notice of each Excursion be communicated to members by the Secretaries.

VII.

That fortnightly meetings be held for the purpose of reading papers; such papers as far as possible to treat of the Natural History and Archæology of the district. These meetings to be held during the months from November to April, inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collections of scientific objects of the district. The details of this Rule to be left to the discretion of the Committee for the time being.

IX.

That the annual meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's financial statement, shall be presented, the committee and officers elected, bye-laws made and altered, and any proposed alterations in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretaries, considered and decided upon.

NOTICE TO MEMBERS.—*The Treasurer's receipt for the Annual Subscription entitles the holder to free admission to the Museum of the Natural History Society.*

The Belfast Naturalists' Field Club.

REPORT OF THE COMMITTEE FOR THE YEAR 1865-66.

In presenting their Annual Report at the close of the year 1865-66, the Committee of the Belfast Naturalists' Field Club are happy to be in a position to state that the practical usefulness of the Society has not diminished, although the attendance of the members at the Field Meetings during the past session was not as numerous as heretofore. The popularity which the novelty of the undertaking at first commanded, has, to a certain extent, fallen away; but this and other hinderances are more than compensated for by the character of some of the members, whose zeal and determination is calculated to increase the interest, further the object, and secure the permanence of the Club.

During the past Session, Messrs. Patterson and Brett, who acted as Secretaries, resigned that office. The circumstances which occasioned their resignation, together with the delay in transferring their duties to the present Secretaries, caused some interruption to the business of the Session.

Five Field Meetings only were held last Summer, and the Committee regret that the attendance was not as numerous as might be expected. They hope, however, that the arrangements to be made for the coming Session, to encourage the free interchange of opinions, and afford information on the field, thus increasing the value of the meetings, will be appreciated by the members generally, and that they will avail themselves of the opportunity thereby given of acquiring a practical knowledge of natural science, and investigating the very many interesting phenomena which come within the sphere of the Society's operations.

On the 20th May, last year, the first Excursion for the Session was made to Woodburn River, a locality of special interest for the Geologist, and particularly so since the publication of Mr. Tate's very excellent paper on the "Cretaceous Rocks of Ireland." Throughout the district instructive sections occur, including outcrops of the black argillaceous shales of the Lower Lias, the glauconitic sands, and grey marls of the Hibernian greensands, the chloritic sandstones, and the Upper Chalk, each bed being characterised by its own set of fossils, some being particularly rich in species. The relation of those beds to the Keuper marls of the New Red Sandstone is well defined, and can be readily traced, and as the whole district is intersected by Trap dykes which occasion numerous faults and dislocations, it becomes a very good field for Geological explorations. At this meeting the following fossils were collected:—*Terebratula biplicata*, *Terebratula obesa*, *Rhynchonella robusta*, *Pecten virgatus*, *Pecten orbicularis*, *Pecten quinquecostatus*, *Spondylus spinosus*, *Lamna acuminata*, *Amorphospongia globularis*, and others more common. The season and locality were also favourable for botanical specimens, and as the members examined the district from the Woodburn River, to the Knockagh Mountain, they were enabled to add the following species to their herbaria:—*Saxifraga hypnoides*, *Sisymbrium thalianum*, *Carex dioica*, *Melica uniflora*, *Valerianella olitoria*, *Equisetum umbrosum*, *Epilobium angustifolium*, also the adder's tongue fern (*Ophioglossum vulgatum*) and the rare moss (*Splachnum ampullaceum*).

On Saturday, the 10th July, the second Excursion was made to Templepatrick. Captain Brooke having granted permission, the members had an opportunity of seeing the Castle, the residence of Lord Templeton, and which presents a fair example of the domestic architecture of Queen Elizabeth's time. Having inspected the Castle and grounds, the party

proceeded to the Moat, about $2\frac{1}{2}$ miles to the North-West, on Donegore Hill, which formed the camping ground for the rebels in 1798, on the night previous to the battle of Antrim. Leaving the hill and passing through the neat little village of Parkgate, the party next examined a very excellent Cromlech, in a grove at Silver Springs, off the road to Doagh, and returned along by the banks of the six-mile water, to meet the evening train at Templepatrick for Belfast. During the day the following botanical specimens were collected:—The very rare river crowfoot (*Ranunculus fluitans*). This species has only been included in the catalogue of Irish plants within the last few years. *Chenopodium Bonus Henricus*, *Chelidonium majus*, *Silene inflata*, *Lychnis vespertina*, *Potamogeton lucens*, *Nasturtium palustre*, the lake bulrush (*Scirpus lacustris*), the creeping scorpion grass, and several species of fescue grass.

Unfortunately the two following Excursions, to Holywood on the 10th July, and to Hillsborough on the 14th August, were so badly attended that very little field work was done.

The fifth and last Excursion of the Club was made on Saturday, the 23rd September to the Belfast Waterworks. The few members that attended examined the source of all the streams that flow from the high ground to the sea, and ascertained that nearly all obtained their supply of water from the outcrop of the greensand below the chalk on the southern escarpment of the trappean plateau. As the object of the meeting was mainly to investigate the nature and extent of the supply of the water to the Belfast Waterworks, very few botanical or geological specimens were collected. It was remarkable that on this occasion the members, owing to the dryness of the season and other causes, were able to examine the beds of the principal reservoirs, on which the herbage grew as luxuriant as in the most highly cultivated meadows.

If all the work done for the year was confined to the Summer Excursions, the Club could not accomplish much good, if the efforts of the Committee are not seconded by the bulk of the members, for whose good alone the Excursions are organized; and they are designed with the view of cultivating a general taste for the pursuit of science, rather than for the advancement or development of special technical subjects. Much good has been done by individual members, who frequently visit and examine in detail the localities around Belfast, and the results of their labours are brought before the Society, either as papers during the Winter Session, or as properly mounted botanical, geological, or archaeological specimens, at our annual conversation. During the past year a few of the members visited the Pomeroy district, and obtained a valuable collection of silurian fossils. The Committee would strongly recommend the members to conduct all their investigations with the view of introducing papers on the subject studied during the Winter Session, it being much more desirable to have papers on subjects studied by ourselves and connected with our own locality, than to depend too much upon the labours of others.

Mr. William Gray read the first paper last Session, on "Water and Water Supply, Geologically Considered." This had reference to the question of the water supply for Belfast, which was so thoroughly canvassed by the public during the Summer of 1865. Mr. Gray noticed the operations of water in producing the physical features of the globe, and its various uses, being essential to the sustentation of all organized beings, explaining the apparently mysterious origin of springs. He proved that the ocean was the grand natural reservoir, from which all our supplies were derived, and to which all waters ultimately returned, to be again sent forth as clouds and rivers, lakes and seas. He then explained the process of evaporation, and the rainfall, and described the various circumstances that affected both, and traced the difference between the rainfall of a district and its available water supply. From the principles laid down, he was of opinion that the calculations upon which the Belfast water supply scheme was founded were faulty, and that the supply would not be as large as was estimated. He believed, however, that the supply from the greensand

below the escarpment of the hills might be very much increased, and that on the whole the present water scheme was the best that could be adopted.

At the second meeting last winter, Mr. Stewart, in a short paper, gave an account of some rare or overlooked species of plants found in this locality during the past year, several of which have not hitherto been recorded as occurring in the neighbourhood. He drew particular attention to the water fennel (*Ranunculus trichophyllus*), which is to be found close to Belfast, and which here produces floating leaves, a phenomenon of very rare occurrence, and observed only in Britain in one or two instances. He further pointed out the distinctions of *Ranunculus fluitans* and *Ranunculus pseudofluitans*, found by members of the Club during the Excursion to Templepatrick. This station is said to be the only one in Ireland where the former plant is really known to occur, and the latter is a new plant only described within the last few years by the Rev. Mr. Newbould, and figured by Syme, in his new edition of English botany, now publishing. Botanists are divided in opinion as to the affinities of *Ranunculus pseudofluitans*, and the position to be assigned it. Some, with Professor Babbington, consider it a variety of *Ranunculus heterophyllus*, others, as Syme, hold it to be a variety of *Ranunculus peltatus*, while Mr. Newbould believes it a distinct species. The reader concurred with the latter, holding his to be the more rational view, and the one that will ultimately prevail. Specimens of those plants were shewn, and also of Lecoc's Poppy, (*Papaver Lecocii*), which was stated to be of common occurrence in sandy fields about Belfast, though hitherto, owing to its close resemblance to *Papaver dubium*, overlooked.

Another rare British species, *Barbarea intermedia*, was shewn to be abundant about Belfast, but, as in the last case, overlooked on account of resemblance to one of its allies; and further, a species was exhibited of the *Hieracium gothicum*, discovered last summer near Cushendall, this being a third locality in Ireland for this rare Hawkweed. Other plants of less note were referred to, and the reader expressed his obligations to Professor Babbington, Ralph Tate, F.G.S., and Alexander G. Moore, Esq., of Dublin, for assistance kindly afforded in determining these difficult species.

At the same meeting, Mr. J. W. Forrester, read a paper entitled, "Some Remarks on a Stone in the Museum, said to be Con O'Neill's Tombstone." This stone, which was shewn at our annual conversazione, has a beautifully sculptured cross on its face, and some other rather ill-defined markings, which have originated several speculations. The stone was found in the wall of a cottier's old house, adjoining the Moat House, in the townland of Ballymechan, County Down. Mr. Forrester gave a full history of the stone itself, and also the history of the celebrated Con O'Neill, and related several anecdotes from the records of the time, and traditions, to illustrate the character of that remarkable man. The two papers thus read on different subjects, furnished matters for an interesting conversation, and proved the wisdom of more frequently introducing papers of the kind, which, being more suggestive than exhaustive, are very valuable, and such as might be readily prepared by persons who have not the time to devote to more elaborate essays.

At the next meeting, on 25th January, 1866, Mr. W. H. Ferguson read a paper on "The Geographical Distribution of Plants."

The object aimed at by Mr. Ferguson was to draw attention to the geographical grouping of plants, and to indicate the laws by which their distribution is governed. He referred to the various families found associated, forming more or less peculiar zones of vegetation, from the polar circle to the equator. Reference was also made to the several plants which, with their allies, distinguished the vegetation of North and South, and gave to the floras of equal latitudes in either hemisphere general facies peculiar to each.

Our own flora was also noticed as illustrating to some extent the law by reason of which a change of plants always marks a difference of latitude or a superior altitude.

On Thursday, the 8th March, Mr. Forrester, read a paper on "The

Round Towers of Ireland." In this very excellent paper, Mr. Forrester gave a synopsis of the various opinions held as to the origin of those remarkable edifices, and described in detail the peculiar features of the most important and perfect towers. A most animated debate followed the reading of the paper, and so much interest was excited as to justify the introduction of the subject again at a future meeting.

On the 15th March, Mr. Plimmer introduced a paper on the "Footsteps of Philosophy." He traced the rise and progress of science from the fifteenth to the nineteenth century, and reviewed the history and deeds of the most prominent scientific men, drawing a contrast between the mental and material light of the present day, and the darkness of the middle ages, and pointed out how frequently great results followed small beginnings; illustrating this by shewing how chemistry had its origin in the alchemy of the earlier ages, and how great discoveries in science were made by men whose first efforts were so often looked upon by the unscientific as useless, if not foolish.

The last paper for the Session, on "Marine Algæ," was prepared by Dr. Holden, and was brought before the Club on 22nd March last.

Dr. Holden dwelt on the "Marine Algæ," as respects their organization, distribution, and economic value. He explained the peculiarities which distinguished "sea weeds" from other cryptogams, and from aquatic phanerogamia.

Interesting particulars were given as to the extensive use formerly made in Britain of these members of the great family of plants, and of their present value, which is still considerable, the chemist having yet to resort to these, as the exclusive source of some substances of very great importance in medicine and in the arts.

Reference was further made to the vast importance of our sea weeds in the economy of nature, oxygenating, as they do, the waters of the sea, and restoring by their chemical action the balance of conditions which countless myriads of animal forms tend to destroy. It was thus shewn that these humble plants are of direct use to man by the substances they elaborate, and which the chemist extracts, and also indirectly they benefit man vastly by rendering habitable ocean's deepest depths.

The Annual Conversazione of the Club was held in the rooms of the Museum, College Square North, on Thursday, the 26th April. The Committee have great pleasure in being able to state that the Conversazione gave every satisfaction, and fully rewarded the anxiety, trouble, and expense incurred in getting it up. Owing to the general response given to the invitations issued, the attendance was numerous, and included nearly all who are interested in the advancement and study of science in Belfast, and several representatives from the scientific societies of the adjoining towns. The Committee thankfully acknowledge the kindness of those members and friends who lent objects of scientific interest for exhibition, particularly to Mr. David Wilson, of Ballymony, Mr. Paisley, of Carrickfergus, and the Rev. Mr. M'Ilwaine, of Belfast, for the valuable contributions of archaeological objects; and to M. R. Dalway, Esq., J.P., for the specimens of the strata passed through in the shaft sunk in search of salt near Carrickfergus. Also to Dr. Hodges, and Professor Purser, of the Queen's College, and Messrs. Ward, Wilson, Scott, Moore, and Magill, for the scientific instruments, artistic productions, and other objects which they so liberally supplied.

The Committee would direct the attention of the members to the prizes offered for collection in the several departments. For the past year there was not as much competition for those prizes as there might have been, and Mr. Donaldson was awarded the only prize competed for, for the best collection of phanerogamic plants.

In conclusion, the Committee would hand over the interests of the Club to their successors, with every prospect of increasing vitality, and extending usefulness.

W. H. FERGUSON, }
WILLIAM GRAY, } HON. SEC.

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THE TREASURER IN ACCOUNT WITH THE BELFAST NATURALISTS' FIELD CLUB.

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To Balance from last year, ...	£15	8	0
“ Balance from <i>Conversazione</i> , ...	1	2	0
“ Mr. Plimmer for Two Excursions, ...	0	3	10
“ Mr. Tate, ...	1	8	11
“ 66 Subscriptions, ...	16	10	0
	£34	12	9

By Postage Stamps,	...	...	...	£1 10 0
“ Prizes,	...	...	...	3 0 0
“ Use of Museum,	...	...	...	5 0 0
“ Gratuity to Curator,	...	...	...	3 0 0
“ Delivering Circulars,	...	...	...	2 5 0
“ Printing Account,	...	...	...	4 16 6
“ Balance in hand,	...	...	...	15 1 3

M E M B E R S, 1865-6.

William Aicken, M.D.
William Alderdice
John Anderson
Mrs. Alexander
Mrs. Andrews
Miss Jane Bellis
——— Barklie
William Borthwick
Charles H. Brett
Henry Burden, M.D.
Robert Boag, jun.
Thomas G. Browne
William Campbell
Samuel M. Dill
George Donaldson
John Darragh
Miss Susan Edgar
William H. Ferguson
Hamilton R. Finlay
John W. Forrester
Rev. John Grainger (Hon. Member)
William Gray
Miss Greer
William Hancock
Miss Sarah Herdman
Alexander F. Herdman
John S. Holden, M.D.
George C. Hyndman
Alexander Hunter
Miss H. Johnston
Rev. A. Kirkpatrick
John Love
W. W. Lamb
Miss Lucy Lamb
Robert Lindsay
John M'Crae, M.D.
Miss M'Clure
Thomas M'Clure, J.P.
Henry Murray

John Mackenzie
Joseph J. Murphy
Joseph W. Murphy
George M'Auliffe
Robert M'Kee
William M'Millen
James Mortimer
William Morris
George O'Brien
Thomas O'Brien
Thomas Plimmer
Robert Patterson, F.R.S.
David C. Patterson
William H. Patterson
William H. Phillips
Miss Robinson
Francis Ritchie
Malcolm Ritchie
Hugh Robinson
W. A. Robinson
W. R. Robertson
Richard Ross, M.D.
Samuel A. Stewart
Samuel Symington,
Robert Smith
George K. Smith
W. Simpson
Alexander O'D. Taylor
Ralph Tate, F.G.S. (Hon. Member)
Professor James Thompson, C.E.
Professor Wyville Thomson
James W. Valentine
H. H. Walker
Thomas K. Wheeler
Edward Weldon
John Ward
Thomas Workman
Robert Workman, B.A.
Robert Young, C.E.

Members elected for the present year will be included in a subsequent list.

Belfast Naturalists' Field Club.

FOURTH SEASON, 1866-7.

LIST OF OFFICERS.

Committee.

PROFESSOR JAMES THOMPSON, C.E.

(Chairman).

WILLIAM CAMPBELL.

W. H. PATTERSON.

JOHN W. FORRESTER.

H. H. WALKER.

HUGH ROBINSON.

SAMUEL A. STEWART.

ROBERT YOUNG, C.E.

SAMUEL SYMINGTON.

JOHN ANDERSON.

WILLIAM AICKIN, M.D.

WILLIAM HANCOCK.

Treasurer.

WILLIAM H. PHILLIPS.

Secretaries.

W. H. FERGUSON

|

WILLIAM GRAY.

Belfast Naturalists' Field Club.

FOURTH SEASON.

THE Committee offer the following Prizes, to be competed for during the Session ending March 31, 1867 :—

I.	For the Best Herbarium of Flowering Plants,	...	...	£1	0	0
II.	For the Second Best do.,	...	...	0	10	0
III.	" Best Collection of Mosses,	...	...	0	10	0
IV.	" Best do. Seaweeds,	...	...	0	10	0
V.	" Best do. Ferns,	...	...	0	5	0
VI.	Best Collection of Cretaceous Fossils,	...	...	0	10	0
VII.	Do. Liassic do.,	...	...	0	10	0
VIII.	Do. Palæozoic do.,	...	...	0	10	0
IX.	Do. Marine Shells,	...	...	0	10	0
X.	Do. Land and Fresh-water Shells,	...	...	0	10	0
XI.	Best Collection of Archæological Objects,	...	...	0	10	0
XII.	Mr. Plimmer offers a Prize of 10/6 for the Best Collection of any or all the above, collected at the Excursions or Field Meetings of the year.					

All Collections to be made personally during the Session, within the Province of Ulster. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in flower, and classified according to the natural system. The Prizes to be in books, or suitable scientific objects, at the desire of the successful members.

THE FOLLOWING EXCURSIONS HAVE BEEN ARRANGED FOR THE SESSION.

On June 2nd, to WHITEHEAD.

The last week of June, to CUSHENDALL, by the Coast Road.

The third week of July, to SHANE'S CASTLE.

The second week of August, to WOODBURN RIVER.

The last week of August, to CASTLE ESPIE.

The second week of September, to KILCORIG and LISBURN.

Due notice will be given to the members as to the day and object of each Excursion; and the members are invited to avail themselves of the arrangements to be made at each meeting, for giving every information to inquirers.

W. H. FERGUSON, }
WILLIAM GRAY, } HON. SECS.

BELFAST, 30th May, 1866.

PRESENTED

7 APR. 1903

Rhs 4-5

General statement

Presented

17 FEB 1886

Rpts. 4-5 bound separately.

Sixth Annual Report
OF
THE BELFAST
NATURALISTS' FIELD CLUB,
1868-69.



PRINTED FOR MEMBERS ONLY.

1849

1849

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1849



50 King Street

Belfast 8th Feb

1886

To / W. W. Woodward Esq /

Sir / Your note of 4th inst.
has reached me through Mr Stewart
& I have pleasure to day in responding
to your request by sending such parts
of our proceeding as are still to be
had. - This includes all from the
year 1868-69 to date of publication
I also send you "Guide to Belfast
& Adjacent Counties" published by
our Club in 1874 which gives



special prominence to Nat Hist
& Archaeology

I am Sir Yours Respt

Wm Stanston

Hon Secy

S. 15.

SIXTH ANNUAL REPORT

OF THE

BELFAST NATURALISTS' FIELD CLUB:

WITH

STATEMENT OF ACCOUNTS,

AND

A List of the Office-Bearers and Members.

FOR THE

YEAR ENDING 31ST MARCH, 1869.



BELFAST: PHILLIPS & SONS.

1869.

PHILLIPS AND SONS, PRINTERS, BELFAST.



REPORT

OF THE

BELFAST NATURALISTS' FIELD CLUB.

THE Committee of the Belfast Naturalists' Field Club, at the close of the sixth year of the Society's existence, have again to congratulate the members on its prosperous condition. There are now 180 members on the roll. The few who, from time to time, join the Club for mere novelty, drop off again as readily; but the great majority of the members now enrolled have joined either from their love of the Society's pursuits, or for the purpose of aiding those interested in carrying out its objects.

The Subscriptions have been well paid up, and the Treasurer is enabled this year to show a balance of £16 2s 7d.

The popularity of the Summer Excursions continues, and during the past year the following places were visited:—

Shane's Castle,	On the 23d May.
Giant's Causeway,	„ 10th and 11th June.
The Gobbins, Islandmagee,	„ 11th July.
Collin Glen,	„ 25th July.
Coast Road,	„ 12th and 13th August.
Scrabo Hill, &c.,	„ 5th September.

An account of each of those Excursions is appended.

During the Winter Session, the following Papers were read:—

1868.

Dec. 3rd.—“The Colosseum at Rome,” by Mr. Shakspeare Wood.

Dec. 17th.—“Observed Phenomena during a recent Storm,” by Mr. W. H. Patterson.

„ “The Cranoge of Ballylough,” by Miss Wilson.

„ “A Visit to the Sperrin Mountains,” by Mr. S. A. Stewart.

1869.

Jan. 10th.—“Belleek Pottery,” by Mr. William Gray.

Jan. 26th.—“A Visit to the Glens of Antrim,” by Mr. William Miller.

„ “Mr. Rogan’s Quaint Descriptive List of the Antiquities,
 &c., in Mr. Walsh’s Collection, Dromore,” by Mr. W.
 Gray.

Feb. 4th.—“The Microscope; and How to Use it,” by Mr. Lewis G.
 Mills, L.L.B.

Feb. 18th.—Evening devoted to an Exhibition of Microscopes.

Mar. 4th.—“Archaic Anthropology,” by Dr. Holden.

Mar. 18th.—“A Notice of some Ancient Tombstones at the Abbey Church
 of Movilla, County Down,” by Mr. W. H. Patterson.

„ “The Flaked, Chipped, and Worked Flints found in the
 Gravels in the Neighbourhood of Holywood, Co. Down,”
 by Mr. J. H. Staples.

April 1st.—“Sponges,” by Rev. Dr. MacIlwaine.

Abstracts of those Papers are appended.

Four Collections have been submitted in competition for the Prizes offered by the Club; and Robert Patterson, Esq., F.R.S., and Joseph Wright, Esq., F.G.S., were appointed judges, to report on the merits of the collections, and these gentlemen have reported as follows:—

“We have much pleasure in looking over the different collections of objects submitted to our inspection. They all, in our opinion, fulfil the prescribed conditions, taking for granted that the species are correctly named, which we are not disposed to question.

“1. The collection of Mosses submitted by Mr. Geo. Donaldson. This consists of ninety-one species, the locality and date being in every instance attached. The specimens have been selected and mounted with great care, and testify the great zeal and assiduity of the gentleman of whose herbarium they form a portion. The graceful appearance of many of them cannot fail to strike the most casual observer.”

“2. The collection of Cretaceous Fossils submitted by Mr. S. A. Stewart comprises seventy-eight species and two named varieties, a number that could only have been brought together by a very great amount of personal exertion, and an expenditure of time that none but a zealous votary of science would devote

to such subjects. They are all carefully selected and displayed, and convey a great amount of information respecting the species which are to be met with in this neighbourhood.

“3. The collection of Shells submitted by Mr. Wm. Swanston consists of 123 species, all Marine, varying in size from some of the largest that our coasts supply, to some that are almost microscopic. Many of them have been brought up by the dredge, and in all such cases the depth has been recorded. The specimens have been chosen with much care and judgment, and are strikingly and tastefully arranged.

“4. As to the series of twenty-five ‘Microscopic Slides’ submitted by Mr. W. Gray, we have examined several of them, with the assistance of one of Smith and Beck’s microscopes, and have found the objects carefully displayed, and free from defects in mounting, and the series remarkable for its very neat and tasteful appearance, being evidently the work of a skilful manipulator

“All of the four collections we consider worthy of the Prizes announced by the Committee, and we recommend that they shall be awarded accordingly.

“ROBERT PATTERSON.

“JOSEPH WRIGHT.

“Belfast Museum, 22nd April, 1869.”

The Club still enjoys the very great advantage of meeting in the Rooms of the Natural History Society, and the Committee hope that the good feeling existing between the two societies may continue to the advantage of both.

It has long been felt that there should be, in the Belfast Museum, collections illustrative of Local Natural History, Archæology, &c., and the Committee are of opinion that this Society might do something towards providing these collections, if suitable provision were made for their exhibition by the Council of the Natural History Society.

The Committee had the advantage of consulting with a deputation from the Natural History Society with reference to co-operating during the Winter Session in providing Papers, and it

was thought advisable to arrange that the alternate fortnightly evenings should be devoted to the Natural History Society and this Club, respectively, and that the meetings of both societies should be open to all the members of each. The Committee now recommend that their successors should try this arrangement next session.

The Committee desire to record their thanks to Mr. Shakspeare Wood, of Rome, and Mr. Lewis G. Mills, LL.B., of Armagh, for coming from a distance to read Papers before the Society. The Committee also desire to express their obligations to the Natural History Society for the continued use of the Museum, and for their manifest desire to co-operate with this Society in the furtherance of their respective objects.

After the adoption of the above Report, the Rules of the Society were discussed, and considerably altered, and the Officers for the next year were elected. Fourteen new members were elected—Professor James Thomson, Queen's College, being elected President, and John Anderson, Esq., F.G.S., Vice-President, Messrs. Gray and Robinson, Secretaries, and W. H. Phillips, Treasurer.

WILLIAM GRAY,

Hon. Secretary.



Dr. *Belfast Naturalists' Field Club in Account with Treasurer.* Cr.

To Balance from 1867-8, ...	£4 18 8	By Expenses of Conversazione, ...	£12 9 4
„ Subscriptions, ...	41 0 0	„ Postages, ...	2 18 0
„ Arrears do., ...	4 0 0	„ Delivery of Circulars, ...	1 10 0
„ Subscriptions for Prizes at Fern Show, ...	1 15 0	„ Advertising and Printing, ...	16 0 0
„ Conversazione Tickets Sold, ...	9 12 0	„ Stationery, ...	1 1 9
		„ Prizes, ...	1 4 0
		„ Do. at Fern Show, ...	2 0 0
		„ Use of Museum, ...	5 0 0
		„ Curator, ...	3 0 0
		„ Balance, ...	16 2 7
	<hr/> £61. 5 8 <hr/>		<hr/> £61 5 8 <hr/>

Audited and found correct,
WILLIAM GRAY.
W. H. PHILLIPS, *Treasurer.*



SUMMER SESSION.

The following Excursions were made during the Summer Session :

On Saturday, 23rd May, to

SHANE'S CASTLE.

The weather had been very unsettled for some days previous ; notwithstanding which a party of about forty, including fifteen ladies, assembled at the Northern Counties Railway Station, and left by the 9.30 train for Randalstown. There was a continuous downpour of rain the whole way, scarcely admitting of an occasional glimpse of the country. As the train dashed on through wind and rain, a formal meeting was organised in the saloon carriage, and seventeen new members were elected. The station-masters at Ballyclare Station and at the Junction, probably seeing the hopelessness of expecting to get flowers elsewhere, handed the members bunches of the beautiful Woodbine that grows so profusely around their stations. Indeed, the well-trimmed gardens, and the neat and orderly appearance of the stations on the Northern Counties Railway, might be copied with advantage by other lines from Belfast. When the train arrived at Randalstown, the rain was still so heavy that the party adjourned to the hotel for consultation. There it was proposed, and unanimously carried, that the day's programme should be gone through, independent of the weather. Accordingly, cars were ordered for a few of the ladies, the majority preferring to walk ; and, having previously obtained special permission, entered the park by the Randalstown gate, the day's work was commenced under circumstances that Field Naturalists only could hope against. About an hour after, the rain cleared off, the sun shone forth, and the latter part of the day became beautifully fine ; and, although the wet weather prevented much that might have been done, the party enjoyed their trip through the park, visiting several spots of

interest, including the rockery, where there is an epitome of the botany, archæology, and geology of the neighbourhood, the botany being represented by a variety of well-selected plants, and all the known ferns of the park, from the Royal Fern to the little Adder's Tongue. Archæology is represented by one of the oak boats found in a bog near Toome. The boat is twenty-six feet long, and was cut out of one piece of oak. One of the same fleet was recently sent to the Museum of the Royal Irish Academy. The geology of the rockery is also interesting, exhibiting the columnar structure of the Trap, which here occurs over a bed of lignite. The caretaker also pointed out masses of crystallised carbonate of lime, obtained from the Trap near the margin of Lough Neagh. Some of the members picked up portions of the well-known fossil-wood of Lough Neagh. After exploring the old castle and graveyard, the party walked on to Antrim, some of the members visiting the Round Tower, while others had a run through Lord Massereene's Park. Again uniting at the railway, the whole party returned to Belfast by the 5.40 train from Antrim, the thorough enjoyment of the afternoon having more than compensated for any inconvenience resulting from the determination to persevere through the morning's wet.

On the 10th and 11th of June, to

THE GIANT'S CAUSEWAY.

Members and friends, to the number of thirty-four, rendezvoused at the Northern Counties station at a few minutes before half-past nine o'clock, accommodation for the entire party having been provided through the kindness of E. J. Cotton, Esq. Ladies, as well as gentlemen, left the station, apparently determined to make the best of their trip. A few small travelling bags, tourists' knapsacks, geological hammers, and botanical boxes formed the whole of their luggage.

The morning lowered, and even at times evidently threatened rainfall, but Portrush was reached with nothing more disheartening,

The Round Tower of Antrim, with its associations ; the rush of the train through the mosses and peat-deposits on the way to Ballymena ; the peep at the tower of the elegant parish church of this town, rebuilt under the direction, and with the aid, of the Rev. Dr. Reeves, Ireland's accomplished antiquarian ; with the distant appearance of Sliemish, associated as it is with Ireland's patron saint ;—all these furnished an abundant supply of suggestions for travel-talk to the antiquarians and archæologists of the party.

At Coleraine, owing to a pre-arrangement, the party were favoured with an inspection of the far-famed "Dalriada brooch." This pleasing addition to the incidents of the excursion occurred chiefly through the kindness of Mr. Gilmore, Coleraine, the possessor of this precious relic of Ireland's former glory. Our space prevents us from particularising the history and the appearance of the brooch, already fully described in the "Ulster Archæological Journal." It is of the purest gold, and must have been worn in ancient days by one of our native chiefs, if not kings, highest in rank.

Portrush having been reached, the submerged peat-bogs in the neighbourhood of the Black Rocks were visited, and a few blows of the hammer, and application of the spade and pick, brought to light some very interesting animal remains, in the shape of several Colæoptera, embedded in the partially-fossilised peat. The shell-bed, or raised beach, indicating the former sea-level at Portrush, was afterwards explored, where the guide of the party, Mr. Gray, drew attention to several shells, of existing species, but now wanting in this locality—*cypræa* being among the number, several specimens of which were picked up by members of the Club. Having examined the altered Lias on the beach, which was at one time such a puzzle to geologists, owing to its apparent Plutonic origin, the party proceeded, some on cars, provided for their transit, and the more earnest and agile on foot, by the way of the Long Strand, at the White Rocks, to Dunluce Castle, the appointed place of rendezvous for the whole. On the way, a cave in the white chalk cliff beneath the road, and communicating with the sea, was visited, and the rendezvous at Dunluce Castle succeeded. Nearly the entire of the party crossed by the old beaten track, over the still-existing precipitous cliff, and explored the ancient stronghold so boldly over-

hanging the Atlantic waves. The "auld wives' stories" of the MacDonalds and MacQuillans were faithfully recounted by the "*genius loci*" personified by the rustic antiquarian, who, very good-humouredly, acted as cicerone.

At about 6.15 p.m. the Causeway Hotel was reached, where a plentiful and highly-appreciated meal was partaken of, and, we may safely say, done ample justice to.

After dinner, an adjournment took place to the grand attraction, the Giant's Causeway, on which "the whistle" of the conductor and Hon. Sec. of the Club called a general muster shortly after sunset. We may just observe, in a passing way, that the sound of the aforesaid instrument, and the sight of its owner, produced a magic effect on the entire "*corps diplomatique*" of guides, who had mustered in strength proportionate to the numbers of the Club, but who felt that their occupation was, if not gone, certainly superseded "for the nonce" by Mr. Gray. In consequence of the "heavy swell" on the sea, the boats could not be used, and the party contented themselves by visiting Portcoon cave, from the land side, and, by the aid of blue-lights, were enabled to obtain an accurate idea of its extent and grandeur. The clouds of evening, and a somewhat threatening atmosphere, although they had but little effect on the hilarity of our tourists, yet suggested thoughts of home, *alias* hotel, where the whole party met once more, at about half-past ten o'clock. Some of the most adventurous had found their way as far as the "amphitheatre," and had scaled the heights of the headland, returning thus to their starting point. The rest had wended their less adventurous road by the lower route, and all met, equally delighted with their Causeway experience. The gray aspect of the evening, with the unusually grand surf which whitened the whole of the rocks, presented this wonderful natural production to many of the parties in a new point of view.

A vote of the party was taken before bed-time as to whether Ballintoy and the Lias beds found there should be attempted in the morning. The majority, however—indeed, nearly the entire—agreed to leave that for another excursion.

Thursday morning rose clear and full of sunshine, presenting a marked contrast to the preceding sunset. Breakfast over at half-

past eight a.m. "sharp," the entire party once more set out for a second sight of the marvellous Causeway. This was effected, and the glories and beauties of the natural scene which it presents even more thoroughly enjoyed. Our tourists were highly favoured in the weather—light and shade, sombre hues, and bright sunshine being alternated in the most agreeable manner.

The first sound of Mr. Gray's well-known whistle found the entire party at the foot of "The Grandmother" (of course our readers know all about Finn MacCoull, and this his aged and respectable relative). The next aspect of the expedition was to find the whole party (ladies and all) seated on the very topmost peak of the aforesaid cliff; and we question if often a more numerous—certainly never a more pleased and unanimous—gathering of tourists have found themselves so accommodated.

Their next *ensemble* was on the "Honeycomb" rock, where occurred an incident of the excursion certainly not the least interesting. Through the kind foresight of Mr. Gray, the well-known photographic artist, Mr. Mack, of Coleraine, was in attendance with his apparatus, and the whole party were "taken;" so that the Club and its friends have a more pleasing and permanent memento of this their second excursion for 1868, than most of its predecessors. After thoroughly examining the "Causeway" and its wonderful columnar structure, the party mounted the face of the cliff by the Shepherd's Path, and visited the several points of view as far as the Chimney Head, from which a most magnificent view of the coast is obtained, extending from Innishowen Head, on the West, to Rathlin, in the East, including the fantastic forms of the "White Rocks," and the sublime grandeur of the Causeway cliffs. The cliffs were, in some places, fragrant with the blooms of *Rosa spinosissima*, and other wild roses. The Causeway itself yielded the Swine's Cress and other plants, and one of the party gathered the Sea-Spurge, the Wood Clubrush, the Vernal Squill, and the Sea-shore Convolvulus on the banks and sand-hills near the River Bush. Leaving the headlands, our excursionists had a smart walk over the heath to the Causeway Hotel, where, at one o'clock, an excellent luncheon awaited them, and in a style most creditable to Mr. Coleman's excellent hotel. Hence "the long cars" to Portrush, and

the train at 3.35 to Belfast, where the entire party found themselves, "sound in life and limb," at 6.45, well pleased and thankful, and, we have little doubt, invigorated for their town avocations, by this really-delightful, well-planned, and safely-executed excursion. "*Laus Deo!*" and thanks to the excellent heads and hands of the Committee and their invaluable Hon. Sec., who carried the whole to so happy a termination. Seven new members were elected at the meeting, and a vote of thanks was passed to Mr. Mack for kindly waiting on the Club to include them in a view of the Causeway.

On the 11th July, to

THE GOBBINS.

A goodly number of ladies and gentlemen assembled at the Northern Counties Railway Terminus, and proceeded at 9.30 a.m. to Ballycarry, at the head of Larne Lough. On leaving the train at Ballycarry, the party proceeded on foot, reaching the shore a little to the north of Blackhead. Here a number of detached boulders, of immense size, that lay along the beach, at once arrested attention, and gave rise to much discussion as to how they came there. Those who study "superficial geology" find ample proof that ice, during a remote glacial period, was mainly instrumental in fashioning our hills and valleys; and the agency of ice in the transport of these detached rocks is in the highest degree probable. An interesting example of ice-work may be observed in a quarry hard by. Here the Chalk is overlaid by a thick deposit of "Boulder Clay." This contains the usual scratched pebbles of the "Drift," and, when removed, the rock surface is seen to be polished and scored, adding another good instance of "glaciation" to those already noticed in our neighbourhood.

No locality more instructive to the geologist than the shore between Blackhead and the Gobbins could have been visited. Here are seen sedimentary rocks of various lithological characters—limestones, clays, and sandstones; and belonging to several geological

formations, from the lower Lias to upper Tertiary. Some of the beds are richly stored with the fossil remains of organisms, long since extinct, and will continue to yield to inquirers, yet unborn, those evidences that have enabled a generation of geologists not yet passed away, to build up their science on an orderly and unassailable basis. The stratified rocks are overlaid by that great capping of basalt that forms such a marked feature in the geology of our country, and which, descending perpendicularly on the East side of Islandmagee to below the sea level, gives us the Gobbin Cliffs.

Another feature noticed on the shore south of the Gobbins was the number and extent of the landslips, or rather rockslips, that have taken place. All along the Antrim coast, wherever the Lias clays crop out at the base of the cliffs, the superimposed rocks slip down, and to this we owe much of our rugged and uneven scenery. Here, in Islandmagee, were some slips on an extensive scale, and one in particular, of a striking nature. A mass of rock, consisting of limestone and trap, that must weigh some thousands of tons, has not only slipped down, but been overturned. The rock mass has turned over bodily—chalk and trap together—so that the layer of flints between the chalk and the basalt, which, in the normal state, is horizontal, is, in this case, vertical.

This phenomenon deserves to receive attention, and it is to be hoped that some member will bring the subject before the Club at one of the winter meetings. The scenery of the Gobbins, while delighting the lovers of the picturesque, is equally striking when viewed by the geologist. The stupendous basaltic cliffs testify to the vastness of the volcanic forces in action at that era when the Trap, of Antrim, was poured forth as molten lava. It is not easy, when studying such a region, to accept the doctrine of that modern school of geologists who maintain that the forces now at work are the types, not only in kind, but also in degree, of those geological forces that from the first have been concerned in moulding the earth to its present form. A number of good fossils were obtained by those who came provided with hammer and chisel. In the Greensand several specimens were got of *Microbacia coronula*—a coral rarely met with; also, *Pecten orbicularis*, *Exogyra levigata*, *Vermicularia concava*, *V. quinquecarinata*, and several species of *Rhyn-*

chonella and *Terebratula*. The Lias clay yielded good specimens of several of the species most characteristic of the *fauna* of the lower Liassic period: doubtless, had time permitted, the list might have been largely increased.

Though the area examined by the Club on this occasion yielded no plants of great rarity, yet it was not without interest to the botanical student. The rugged charms of the scenery were heightened by the presence of many of the principal ornaments to our native *flora*. Here, untrimmed and untamed by the hand of man, they rejoiced in all the freedom and luxuriance of nature. The shady recesses of the cliffs were garlanded by the trailing stems of the Wood-Vetch (*Vicia sylvatica*), the handsomest of British climbing plants. Its large and elegant papilionaceous flowers, displayed in profusion, tended to modify and soften down the harsher features of the scene, if, indeed, any of Nature's works could appear harsh under the glowing sunlight of such a day. *Campanula rotundifolia* was seen to the greatest advantage on its native rocks and among the heath. This is the Harebell so much loved and sung by poets:—

“E'en the slight harebell raised its head,
Elastic from her airy tread.”

Its conspicuous, yet modest, flowers were in all the freshness of their early bloom, and justified the preference accorded by so many refined and cultivated minds. The Agrimony (*Agrimonia eupatoria*), noted among herbalists as a “vulnerary,” was found plentifully on dry banks. In some parts of the country, where primitive customs still prevail, its leaves are used as a native substitute for the tea of the Celestials. The tall spike of showy yellow flowers gives out a fragrance not unlike the odour of the apricot. Of Ferns, the only thing to notice is the Sea Spleenwort (*Asplenium marinum*). This was found on the rock cliffs, and good specimens were secured, not only for the *hortus siccus* of the botanist, but for the conservatory of the pteridologist as well.

On 25th July, to

COLLIN GLEN.

Finlay M'Cance, Esq., J.P., kindly granted the privilege of visiting the glen, and collecting such specimens as might be deemed of value. At twelve o'clock, a number of members left town per rail for Dunmurry, from whence they walked to the entrance of the Glen at Woodbourne, and were joined during the afternoon by parties who arrived by other conveyances. The steep and rugged banks of this fine glen are richly clothed with ferns, and, in the course of the day, several good varieties of these elegant plants were picked up. Those who came provided with the implements of the geologist made the best use of their time, and succeeded in disentombing many relics of past geological eras. The water in the stream was very low, and, in consequence, the thin stratum at the base of the Lias, known as the "bone-bed," was accessible, and yielded abundance of small scales and teeth of *Hybodus*, and other ancient Ganoid fishes that peopled the seas at the close of the Liassic period. Further up the Glen, the upper Greensand is exposed in good sections, and here some fair specimens of its characteristic shells were secured—among the rest, the *Terebratula Hibernica*, figured and described by Mr. Tate from this very locality, and as yet found nowhere else. Some good fish teeth also were obtained in this bed, including specimens representing the genera *Corax* and *Lamna*, and a rare palate or crushing tooth of the *Ptychodus mammillaris*. At the close of the proceedings, the party divided, some returning by way of Dunmurry and the railway, while others preferred enjoying the fine evening by walking into town by the Hannahstown road.

On the 12th and 13th of August, to

CUSHENDALL,

By the Coast Road.

The long-looked-for rain having set in on the previous day, with every prospect of continuing wet for some time, only fifteen

members—the majority ladies—ventured to start on Wednesday morning. The day was beautifully fine, the atmosphere was clear, and the country looked all the better after Tuesday's heavy rain. Reaching Larne by the Northern Counties Railway, a long van was in attendance to convey the party by the beautiful coast road to Cushendall, and, as usual, every point of interest along the route was visited. At what is called the Little Deer Park, within two miles of Glenarm, the geologists of the party examined the landslips occasioned by the slippery nature of the Lias clay, over which the Chalk, and, in some places, the Trap also, have been sliding for years, and now lie broken and scattered in the wildest confusion, adding considerably to the beauty of the scenery of this interesting locality. Several fossils were procured from the Lias and Greensand. Some of the Ammonites from the Lias were very good. A slow drive into Glenarm gave the party an opportunity of examining the coast, including the Bays of Glenarm and Carnlough. At Glenarm, a halt was made, and a visit made to the Earl of Antrim's park and gardens, now in excellent order, and a credit to the skill and energy of his lordship's gardener.

A visit was also paid to the museum of Mr. Thompson, who has from time to time collected a great variety of specimens, illustrative of natural history, archæology, and geology, and has them arranged in such a manner as would be creditable not only to our best private collections, but to many of our larger museums. The van being again made ready, the party drove off for Garron Tower, tracing the beautiful Bay of Carnlough. An order, kindly given by R. Wilson, Esq., admitted them to the Castle of Earl Vane.

This residence, romantically situated on the rocky headland of Garron Point, was built by the late Marchioness of Londonderry, and no expense was spared in making it worthy of the taste, wealth, and exalted rank of her ladyship. The present heir is a son of Earl Vane, and, being a minor, the property is vested in trustees for his benefit. Having been shown through the several apartments, by the courtesy of Mr. Todd, the party left the Castle, and descended to the road, and again took the car for Cushendall, taking time by the way to admire the bold cliffs that line the road, and enclose the extensive valley of Glenariff. After the fatigues of a long drive,

the party were delighted when they arrived at the Glens of Antrim Hotel, at eight o'clock in the evening. Here the resources of Mrs. Martin's establishment were called into requisition; her excellent fare disposed of, and all were made comfortable for the night.

It had been determined to visit Glendun and Glenariff the next day, and every arrangement was made for the purpose; but, ere the day dawned, a violent storm of drenching rain set in, and continued, without the slightest intermission, for the entire day, cutting off all hope of the party's anticipated enjoyments. The swelling flood seemed to rejoice in their disappointment, and the whistling wind to mock their leader's call. Imprisoned thus, the interval between an early breakfast and the hour for lunch was passed in pleasant games; and the severity of fate's decree was softened by the melody of song—nor was the object of the trip neglected. Mr. D. Black, of Cushendall, kindly introduced his excellent geological map of the district, and pointed out the occurrence of the various geological formations from Carnlough Bay to the slopes of Knocklayd. A substantial *dejuener*, at two o'clock, prepared the party for the drive home, for which they started soon after three o'clock, under a complete deluge of rain. The grand old cliffs and beautiful landscapes along the route that, on the previous day, were bathed in sunshine, were now enveloped in storm-clouds, ever and anon rolled back by the fury of the wind, furnished glimpses of shattered rocks and falling waters, torrents bounding from the hills, and waves breaking from the sea. Notwithstanding this continued severity of the weather, the party arrived safely at Larne, in time for the last train for Belfast.

On 5th September, to

SCRABO HILL AND MOVILLA.

Having arrived at Newtownards by the train leaving at ten o'clock, the party walked on to the interesting ruins of Movilla, or Magh Bile, a distance of about a mile from the station. The Abbey of Magh Bile was founded about A.D. 540, by St. Finian, who died

in the year 572. It was always a place of great importance, and, as such, is frequently mentioned in the annals of Ireland, and so continued until the dissolution of abbeys in the reign of Henry VIII. It subsequently became the property of James, Viscount Clandeboye, and, still later, it fell into the hands of Hugh, Viscount Ardes. The existing ruins are the remains of buildings erected probably in the fifteenth century. The grounds around them constitute the principal burying-place in the neighbourhood of Newtownards, and contain several old headstones, many of them having elaborately-carved stone crosses upon them; so many, indeed, that the party found it impossible to copy them all, and it was resolved that a special visit should be paid to sketch the various old carvings that exist within the graveyard, and bring a notice of them before the Club during the Winter Session. Mr. G. Jamieson, who resides close to the ruins of Movilla, observed the party among the ruins, and came forward and gave some interesting details regarding the place and its surroundings. He then kindly invited the party to his house for refreshments, and pointed out a very old stone which he had removed from the graveyard for preservation. On this stone was written, in old Irish characters, "Pray for Dertrend." Dr. O'Donovan supposed this person to have been a Pictish king, who reigned in Ireland previous to the year 780. Leaving the ruins of Movilla, the party walked back to Newtownards, visited the old Session-house, formerly the parish church, and the market cross, erected in 1636, thrown down by the rebels in 1653, and re-erected in 1666.

Passing through the town, cars were obtained, and a visit made to the Model School, which, for order, neatness, and good teaching, cannot be surpassed in Ireland. Mr. Harbison, the head master, conducted the party through the building, and exhibited his collection of fossils, shells, &c., and then accompanied the party to Scrabo quarries.

Here great changes have been made since the last visit of the Club. The irregular roads, with deep ruts, have been replaced by excellent tramways, and the clumsy arrangements for moving small quantities of stone have given way to travellers, and cranes, and other kinds of machinery necessary to expedite the transmission of

large blocks of stone that daily leave the quarries, to satisfy the increasing demand for this material. In some of the quarries there are beautiful examples of trap dykes, and horizontal beds of trap forced in between the layers of sandstone, sometimes thinning out into mere bands, and again forking like the venation of leaves. The growing reputation of Scrabo stone has caused a wonderful increase in the trade, and the whole face of the hill is now a busy hive of workmen, who turn out all the kinds of stone, from the rough rubble to the largest blocks suited to every kind of structure. Although the rock has been supposed by many to be Carboniferous, it has recently been determined to be of New Red Sandstone age. Passing down from the mountain, the party visited a farm-house, where a supposed font from Movilla Abbey was deposited. Having seen it, the members came to the conclusion that the stone was not a font, but the base of a large stone cross, and recommended that it should be taken back and left amid the ruins of the edifice it once adorned. Having enjoyed a delightful trip, the party returned to Belfast, regretting that the Club's excursions for the year were ended.





WINTER SESSION.

THE Winter Session was inaugurated on Thursday evening, 3rd December, by a lecture on "The Colosseum of Ancient Rome," by Shakspeare Wood, Esq. The interest attaching to the subject selected, as well as the already well-known and well-earned reputation as an artist of the lecturer, attracted a large audience, and, we may add, an appreciative and delighted one. Mr. Wood has been for several years resident in Rome, where his studio has not unfrequently been visited by our fellow-townsmen, and has also been long well known in "the eternal city" as among the best read and most earnest local antiquarians. The chair was occupied by Professor Thompson, C.E., who introduced the lecturer by a few appropriate remarks. Mr. Wood commenced his address by remarking on the three species of public amusements most followed in ancient Rome. In reference to the popularity of such amusements, especially in the days of the decline of the Republic, the saying of the satirist, Juvenal, was quoted, "*panem et circenses*," intimating that all which a degenerate Roman then sought was bread and the games of the circus, or rather of the largest amphitheatre. It was in order to give an adequate idea of the largest and most magnificent of these that the lecture was delivered—namely, the Colosseum, or Amphitheatre Flavium. Its size might be best appreciated by comparison. Our largest building, the Ulster Hall, contains about 2,500 persons—the Colosseum seated 87,000, independently of standing-room for 22,000. The building is oval, and covers six acres of ground, the major axis being 620

feet, and the minor 513. The central portion, styled the arena, is 249 feet in length, by 151 in breadth, the height of the outer wall being 157 feet. Its name was derived from the Flavium family, it having been begun and completed by three Emperors of that race—viz., Vespasian, by whom it was commenced; Titus, who carried it on nearly to completion; and Domitian, who actually finished the whole. Its title, “Colosseum,” may have been derived from its immense size, as being the colossus among buildings. Having minutely described the building in detail, he explained that the entire was so skilfully arranged that the whole multitude occupying this vast space could break up and be dispersed in perhaps less time than the Ulster Hall could be cleared of its contents. The purposes for which the Colosseum was used were then fully discussed and described. The chief of these was the combats of gladiators. Victorious Roman Generals were accustomed to bring back with them wild animals, the combats of which were at first exhibited in the circus. Pliny records the fact of elephants and other wild animals being so exhibited in the circus by Maximus during Pompey’s triumph. Augustus is said to have caused the destruction of 3,500 wild beasts by his will, for the gratification of the populace. A Roman citizen, named Stabilius Taurus, is said, by Dion Cassius, to have been the first to erect, at his own expense, a theatre of stone, which he dedicated with a fight of armed men. Such was the feeling excited in the Saxon pilgrims of the seventh century, whose exclamation, recorded by the venerable Bede, has come down to us—“While stands the Colosseum, Rome shall; when falls the Colosseum, Rome shall fall; and when Rome falls, the world.” The history of the most remarkable exhibitions of wild beasts given in Rome was then fully detailed, from the first on record, on the occasion of the victory of Lucius Metellus over the Carthaginians, in Sicily, in the year 502, from the building of the city. The catalogues of such massacres of beasts and men, until the reign of Gordian III., were enormous. That Emperor is said to have maintained for this purpose 1,000 pairs of gladiators. One hundred lions are said to have rushed at once, on one occasion, into the amphitheatre, whose roaring sounded like thunder. The history, character, and condition of the gladiators—*Venatores bea-*

tiaarii—were next fully described by the learned lecturer. The history of the martyrs, who shed their blood in vast numbers on the arena of the Colosseum, was ably and graphically traced by Mr. Wood; among the foremost of whom was Ignatius, Bishop of Antioch, in the third century. Such scenes existed until the time of Constantine, when Christian martyrdom ceased, while the gladiatorial battles with wild beasts lingered on until the reign of Theodorie, A.D. 519—523. The bloody spectacles of gladiatorial combats are said to have been finally put an end to by the self-dedication of Telemachus, a pious monk from the East, who, in the year 404, rushed between the combatants, and was himself cut down. The Emperor Amorius was so wrought upon by the death of this voluntary martyr that he abolished such cruelties by a decree. The history of the decline and partial destruction of the noble building itself was afterwards most learnedly detailed by the lecturer, but our space prevents us from giving even an extract. Several of the Roman pontiffs endeavoured to utilise the Colosseum, but without success. Sixtus V. and Clement XI. were chief among this number; and, finally, Benedict XIV., in 1750, converted this vast monument of Pagan antiquity to Christian purposes by dedicating it to the memory of the Christian martyrs. It has thus continued to the present day. Pius VII., at a vast outlay, strengthened some of the falling exterior walls, and so preserved it from further decay. It has since been visited by Christian pilgrims of every creed, as among the most sacred spots of earth, and consecrated to the memory of many, though from among the humblest, yet most truly heroic, of the human family.

At the close of the lecture, the Chairman stated that, although the practice of the society precluded the passing of a formal vote of thanks to the lecturer, yet he felt bound to convey to him his own high appreciation of the most interesting and valuable statements they had just heard. These sentiments were warmly applauded by the entire assembly, and the meeting separated after one of the most truly intellectual treats it has for a long period been our good fortune to have enjoyed.

On Thursday evening, 17th December, there were three papers read. Mr. W. H. Patterson gave a full description of the effects produced on the wires and poles of the Ulster Electric Telegraph Company during the thunderstorm that occurred on the 25th May last, on which occasion some ten or a dozen of the telegraph poles were split up and broken in a remarkable manner—in some cases the pole was shattered into small splinters like matchwood. The effect extended over a length of about 800 yards of the telegraph line.

Miss WILSON, of Ballymoney, read the following Paper :

“NOTES ON THE CRANNOGE OF BALLYLOUGH.”

The remarkable similarity which exists between the Lake habitations of Switzerland and the Crannoges of Ireland cannot fail to surprise the antiquarian, and has been well investigated by Sir Charles Lyell, as well as by other writers. The earliest notice of our Crannoges dates so far back as the 9th century. Some in the North of Ireland are known to have been inhabited in recent times. Even 150 years ago, we read that one was occupied; but it is remarkable that we find no notice of the exploration of one till the year 1839, when the Crannoge of Lagore, in County Meath, was carefully examined. In some cases the dwelling is constructed on an artificial island formed of peat and timber, but in most cases they were built on the shallows of the lake, which were high and dry in summer, but became submerged in winter. Sometimes a causeway led from the margin of the lake to the stockaded dwelling, but more generally there was no means of access save by a boat. Thus they were more secure from the attacks of enemies, as the chieftains who inhabited them generally prohibited all boats from entering the lough, except the one which belonged to himself. The enclosure, formed by stockades of young trees, was, in general, from 60 to 80 feet in circumference—sometimes oval in shape. The stakes found in some Crannoges bear the traces of the hatchet, which was probably the stone hatchet frequently found among the

remains. The interior of the dwelling is generally paved with round logs, cut in lengths, and covered with stones or clay. Flat stones, supposed to serve as hearth-stones, are always found, sometimes in different parts of the enclosure. Large quantities of bones are also found—those of black cattle, sheep, and deer being most abundant. In one instance, the remains of two extinct races were found—those of the Irish Elk and the short-horned Irish Ox. In some cases skulls and other human remains were found, but not often. Antiquities of different periods are brought to light in the examination of the Irish Crannoges; the most usual being querns, swords, knives, fibulæ, chains, bronze spear-heads, beads, stone hatchets, and arrow-heads.

Frequent references are made by the Four Masters to the Crannoges of Ireland, which, undoubtedly, were very important as strongholds, and as the seats of marauding robbers. The first mention of them is dated 848, when the son of Conaing plundered the island of Loch Gabhor, and burnt it down to the ground. In 933 the “iland” of Loch Gavar was pulled down during one of the Scandinavian expeditions, thus proving that the first investigated Crannoge was occupied more than one thousand years ago. From the year 991 to the year 1601 we meet with frequent mention of Crannoges in the “Annals of the Four Masters;” and it is generally supposed that Marshal Bagenal referred to one when, in his description of Ulster, in 1586, he mentions “O’Neill’s lodging in the fens, where he built his lodging, and kept his cattle and all his men.” The most celebrated Crannoge in this country was the one at Ballylough, in the parish of Billy. The name sufficiently indicates the existence of one, although the lough had gradually diminished, so that at the present day there are no traces of it save a marshy bog which surrounds the elevated mound, the former island whereon stood the Crannoge. The annals mention it as one of the many Crannoges which were plundered during the raids of rival chieftains. The following passage, dated 1544, refers to it:—“An army was led by O’Donnel into the Route, and took the Castle of Baille an locha, (Ballylough,) where he obtained many spoils—weapons, armour, copper, iron, butter, and provisions.” There are other references to this important stronghold; but, of late years, its exist-

ence had faded, even in the memory of the family who own the estate, when a recent circumstance revived the traditions concerning it. The present owner, Anthony Traill, Esq., being desirous of draining that portion of the estate where the ancient lake had been, caused a canal to be made, which passed close by the island of the Crannoge, running east and west. The workmen employed in this drain came upon an ancient canoe, which was lying at right angles to the canal. They had considerable difficulty in extracting the canoe from the soft boggy earth, for it was deeply embedded.

After making a short cutting in the direction in which it lay, they succeeded in raising it; but, unfortunately, it was broken across, and the stern came out. It was very rudely shaped from a single piece of oak, and measured twenty-four feet in length, corresponding to the canoe found in the Crannoge of Lake Monalty, near Lisanisk. In the Ballylough canoe was found a hatchet of mixed metal, supposed to belong to a later period. This supposition is founded on the statement of Mr. Shirley, quoted by the learned curator of the Royal Irish Academy, that the objects found in Crannoges are not arranged in chronological order. Metallic objects, for example, which have been deposited on the surface, have been found to have passed several feet into the earth from the rising of the surrounding water. The canoe is of the kind termed "dug out," pointed at one end, and almost square at the other. There are no traces of row-locks, nor of the strengthening pieces of wood found in similar canoes. Owing to the great heat of the weather, and exposure to the sun, it cracked and broke away, so that a satisfactory drawing could not be obtained. Subsequently to the discovery of the canoe, in September, the bones of several domestic animals, and of deer, have been found at the same spot, and lead to the belief that the ancient Crannoge of Ballylough will yield such antiquarian remains as would well repay a more careful examination.

Mr. S. A. STEWART also read a Paper on "A Visit to Dungiven and the Sperrin Mountains." Mr. Stewart said that the Irish Field Naturalist, who had only a few days at his disposal, experienced a

great difficulty in deciding where to go in order to make the most of his time. He is embarrassed, not by want of interesting scenes to visit, but by the conflicting claims of so many localities where picturesque beauty and rare forms of Plants or of Fossils attract his steps. In the estimation of the Naturalist, Ireland is anything but a poor country, though she may appear so in the eyes of a Rothschild. Dungiven was described as a place of very great interest for the botanist. The streams flow from the neighbouring mountains in deep glens that afford some of the best grounds for the collector of rare plants ; and the student of Physical Geology here finds a field open to him that includes the three great classes of rocks—Igneous, Metamorphic, and Sedimentary ; while the palæontologist, who visits the limestone quarries, meets with an outcrop of the Chalk that is richer in organic remains than any similar deposit in the country. For the archæologist, also, there are ancient ruins to explore that will well repay examination, and there still linger here old legendary associations that have long since departed from places less secluded. From the summit of Benbradagh there is one of the finest and farthest-reaching views in the North of Ireland ; and to the lover of the grand and picturesque in Nature the pleasure of such a sight would amply recompense the labour incurred.

The Sperrin Mountains form a great, irregular group, massed in the centre and South-West of the County Derry, and extend into Tyrone. Many of the summits are upwards of 1,500 feet high, while Sawel and Dart are over 2,000 feet. Both of these were visited on this occasion, the journey being made across the mountains to Strabane. A close, but unsuccessful, search was made for the "Cloudberry" (*Rubus chamæmorus*). This rare plant was found here in 1826 by two eminent botanists. It is a species confined to the higher English and Scottish mountains, and has not been met with in Ireland save in this one instance. In the forty-two years that have since elapsed, the "Cloudberry" has not been seen in this its only Irish station, and it becomes a matter of some interest to ascertain if it still exist in its old habitat, and is entitled to hold its place in our Irish flora. As far as this search was concerned, the result was negative, not only as regards the *Rubus chamæmorus*, but also with regard to other rare species. The

poverty of the flora of these mountains was noticed as remarkable. The plants that occupied their heathy and boggy slopes were few in number, and included very few that were at all rare. The least of all the willows, *Salix herbacea*, was found on the summit of Dart, in full flower, though only about two inches high. These rocks also yielded the Starry Saxifrage (*Saxifraga stellaris*), while the cliffs at Benbradagh were cushioned in places with matted masses of the Spring Sand-wort (*Alsine verna*). A very superficial search was made for mosses, and was not without success. *Tayloria serrata*, a species not before known in Ireland, was found on the mountains above Dungiven. This is a fine, handsome moss, hitherto supposed to occur only on the higher Scottish mountains. A more complete examination of these hills would, doubtless, reveal other bryological rarities. The whole of this journey occupied a week, and ultimately extended to Lough Derg, in County Donegal. Several points were touched on in the Counties Tyrone, Donegal, and Fermanagh; and a number of plants were noticed in these counties that have not previously been recorded as occurring there. These were, however, common species, and the reader was satisfied that the scantiness of the recorded floras of some of these counties was not due really to the absence of so many common plants, but rather to the want of local observers. Specimens were shown of *Tayloria serrata* and other plants referred to in the paper, and also of a large number of common species that make up the bulk of the vegetation of the Sperrin Mountains.

At the conclusion of Mr. Stewart's paper, a specimen was shown of the Lesser Snapdragon (*Antirrhinum orontium*), collected by Miss Mulgan, at Struell, near Downpatrick. The Lesser Snapdragon is a plant of the South of Ireland, but has not been previously recorded further North than Dublin.

On Thursday evening, 10th January, Mr. WILLIAM GRAY read a paper entitled "A Visit to Belleek Pottery." In tracing the history of the art, he described the characteristic of Egyptian, Grecian, and Roman Pottery, and referred to the several potteries

established by the Romans—particularly those of Britain—and stated that some of the Irish examples of Earthenware Urns, &c., of a date previous to the Roman occupation of Britain, were some of the best examples of the kind found in Britain, and that they were constantly found in kists, tumuli, and other forms of sepulture. On referring to the Moorish enamelled ware, and the works of the celebrated Pallissy, Mr. Gray said that several enamelled articles of personal ornament have been found in Ireland, but that antiquaries had not determined whether they were imported, or the result of native skill. One of the earliest potteries in Ireland was that established in Belfast at the close of the 17th century. Just then there was a vigorous competition between the Dutch and British potteries, but they were confined to the manufacture of delf, or stoneware; and, in all probability, the ware made at Belfast was similar to the common white ware of the Staffordshire potteries, such as was afterwards made at Youghal, in the County Cork. Brown ware was also made at Belfast, and there was a pottery at Larne. Those potteries have been abandoned for very many years. Brown ware is still made in large quantities by Messrs. Drury, at Youghal, and their ware is extensively used throughout the South. At Belleek, ordinary white stoneware, of superior quality, is manufactured, and also the best Porcelain, not hitherto made in Ireland. Mr. Gray explained the nature and origin of Porcelain—its introduction into Europe, and the development of its manufacture in England—particularly in Staffordshire, the great seat of the British potteries. All the clay used for the manufacture of Porcelain in Staffordshire has to be brought from Cornwall, where it occurs in large quantities from the decomposition of the granite rock of the district. Eighty thousand tons are annually sent to the potteries from Cornwall.

Granite is composed of three minerals—quartz, felspar, and mica; and the Cornish clay, or kaolin, is an accumulation of the felspar from the decomposed granite, and has to be separated from particles of the mica and quartz by laborious washing, &c. On the Castle-caldwell estate, where Belleek is situated, there is no granite; but beds or veins of pure felspar occur over hundreds of acres, and it is from this felspar that the clay for the various kinds of ware is

obtained. The very best kind of Porcelain can be made from the Belleek felspar, for which the Cornish felspar is not suitable. Mr. Gray described several advantages possessed by the Belleek Pottery; amongst others, it has an ample supply of the most superior fire-clay from the sandstone, within about seven miles of the rocks. This clay is required to make the "seggars," or cases, in which the ware is burnt, and must be capable of resisting a very intense heat. For want of material of this kind, some former British potteries had to be given up. The Belleek works were projected by Messrs. M'Birney & Armstrong, and the first ware was made in 1863. The extensive buildings and powerful machinery necessary for a complete pottery establishment have been constructed, with all modern improvements. A large number of persons are employed, from the mere schoolboy up to the skilled potter, modellers, engravers, and painters in enamel, and a great variety of ware is produced. Mr. Gray exhibited a very extensive variety of articles manufactured at Belleek. Some of the most costly were sent up from the works for the purpose; and Mr. M'Cormick, of York Street, Belfast, sent specimens of the ordinary ware, such as tea, toilet, dinner, and dessert ware. Mr. M'Cormick's warehouse, in York Street, is the Belfast depôt for the sale of Belleek ware. Belfast, or any other place, may claim the merit of having first manufactured porcelain in Ireland; but whether they can establish that claim or not is another matter: the superior quality of Belleek ware, both as to the excellence of the material, the skill and enterprise displayed in its manipulation, and the artistic merit of the designs, give it a special character of its own, and declare it to be the first and only manufactory of the kind in Ireland. Mr. Gray described one interesting department of the Belleek works, where a large number of powerful presses are employed in the manufacture of such hollow articles as patch-boxes for ointment, &c., mortars for druggists, and similar ware, from dust powder, by a process invented and patented by Mr. Armstrong, one of the proprietors. The mechanical contrivance secures an equal pressure in every part of the article, and, consequently, equal shrinkage and texture of material. The skill and enterprise directed to procure this machinery has been rewarded by extensive orders for insulators for telegraphs,

of which many hundreds of thousands have already been sent out from Belleek, and are daily in process of manufacture.

On Thursday evening, 26th January, the following communication was read, being the last received by any society from the fruitful pen of the late Mr. G. V. DU NOYER :—

“ *To the Secretary of the Belfast Naturalists’ Field Club.*

“ DEAR SIR,—In the Fifth Annual Report of the Belfast Naturalists’ Field Club, 1867-68, the paper entitled ‘A Run through Galway with a Vasculum,’ by Mr. S. A. Stewart, needs a few comments, in a geological point of view, and I venture to make them, in the simple desire of affording information to a labourer in the field of science like myself.

“ The old Tertiary land, which extended from what is now Ireland to what is now the Northern portion of Spain, and which also connected what is now England with the present coast of France and Germany, was not *depressed* beneath the sea, but was denuded, or carried away by the sea action. Thus Ireland and England became isolated, and thus there was left on them the relics of a *Flora* and a *Fauna* whose centres of creation were on the Continent of Europe, and who radiated as far as what is now the central portion of Ireland, and the Southern portion of what is now England, before this disruption by denudation took place. We have no evidence of a subsidence of this land, now the area of water occupied by the Irish Channel, the English Channel, and the Bay of Biscay, but we have clear evidence in the Drift deposits along our coasts, known to geologists as the *Boulder Clay*, or *Ice Drift*. But this mass of detrital matter, formed of clays and gravels with erratic boulders, which are invariably ice-scratched, once covered the space now occupied by our widest bays, like the Bay of Dublin, and the channel between England and France. Since this Boulder Clay has been swept away, very much of the solid rock on which it originally lay has also been denuded, as we see clear evidence in

the Chalk cliffs of Dover and the North-West of France, about Dieppe.

“On this level plain the existence of which was due to the action of ice, and which was formed during an Arctic period The Cave Bear, the Lion, the Hippopotamus, the Elephant, the Hyena, the Mammoth, the Beaver, and the other extinct animals, whose remains are now found in the caves of Derbyshire, and the Elephant, whose bones have been found in the limestone cave at Dungenarven, roamed, or migrated, as far as their requirements or the climate enabled or led them.

“So it was with the Plants ; the seed of the *Pinguicula* was transported from the Western Pyrenees as far North as the Southern portion of what is now Ireland, and then it rested, as the climate further North was unsuited to its growth.

“The forces of denudation, as exerted by the sea, in the meantime, reached their culminating point, and Ireland became an island, separated each year farther and farther from the Lusitanian centre of creation, on the Iberian Peninsula. And here I would remark that I believe the term *Hibernian*, as applied to certain plants whose most luxuriant habitat is the North of Spain—like the *Pinguicula*—is not correct. It should be *Lusitanian*, as in that ancient province of Spain these plants had their centres of creation, and from which they radiated Northwards. These plants are not *Hibernian*, but Spanish, or *Iberian*, in the sense propounded by Edward Forbes.

“We have no reason to conclude, therefore, that the climate of this Lusitanian fauna and flora was glacial ; on the contrary, these plants and animals lived, like our present inhabitants, on a glacial-formed surface, *but not under a glacial climate*. To suppose the contrary would be assuming a state of things not proved, but rather *disproved*, by the facts that the sea which separated Ireland and England from the Continent of Europe, cut through a glacial-formed deposit, and, therefore, probably *not* under the influence of a glacial climate. In fact, the sea is doing the same thing this present moment—carrying away our Boulder Clay from our coast line, and eating farther and farther into our basement rocks. The only species of plants which could exist in our climate, when Ire-

land and England formed portions of the European continent, *yet exist here*. There has been no destruction of a great flora by a glacial climate: *our flora is just as it ever was*.

"At a hasty glance, it appears wonderful that such a comparatively great and level extent of surface could exist as that which we have supposed to have extended from Ireland to the North-West of Spain, and from England to the continent; yet the present plains of central Russia, and the great Sahara, are three times as extensive as it. Moreover, this plain was by no means a lofty one: a hundred feet, or so, may have made up its maximum elevation above the sea; and if we now find the boulder clay at far higher elevations, I think we may account for its presence there by subsequent movements of upheaval of the land during the period of its destruction. That the geological period antecedent to the present one was, in this country, glacial is true; but I maintain that this glacial period ceased before the plants and animals who migrated, or were carried from their normal centres of creation on the continent, were cut off by the sea, as we have seen them to be.

"The *Pinguicula* grows on the *glacialised surface* of the old Red Sandstone in the Counties Cork and Kerry, yet its present habitat is the Pyrenees, at the North-West of Spain. The glaciation of Ireland would have swept this beautiful little plant completely from off the surface, and Edward Forbes's magnificent theory of the distribution of plants and animals could never have been propounded.

"I think that two great events have been mixed together in the paper I have criticised; and it is well that they should be separated, and clear ideas formed on their relative periods of existence, and on the effects they have produced on our present flora and fauna.

"GEO. V. DU NOYER.

"Antrim, 27th December, 1868.

"WM. GRAY, Esq."

Mr. STEWART made a brief reply, saying that, while feeling much obliged to the late Mr. Du Noyer for compelling him to re-

consider the grounds on which the views in question were founded yet he was not at all convinced that he was wrong in following Forbes. Mr. Stewart then gave a *resume* of the theory by which the late Professor Edward Forbes accounted for the occurrence in Ireland of an isolated group of plants that have their proper home in the North-West of Europe. Forbes thought that these species occupied this country prior to the glacial epoch, and that during the glacial period, which was a period of cold and of subsidence, they were cut off from what is now the Continent of Europe. On the other hand, Mr. Du Noyer has told us that a plain, connecting Spain with this country, existed after the glacial era—in fact, that this plain was formed during that period by deposition—and that when this sea-bottom emerged from the ocean it formed a land surface, over which a migration of plants and animals occurred. Further, Mr. Du Noyer thought subsidence had nothing whatever to do with the isolation of Ireland from the lands of North-West Europe; but that work was done solely by denudation—by the sea wearing away the land. But this view of Mr. Du Noyer's gives much too vast an amount of work to be done by the sea operating as it does now on these shores. The time necessary for this work would be immense, even in the estimation of a geologist; for, remember, it is not only required that the sea should wear away thousands of square miles of rock, but also that the gentle flow of the Gulf Stream, and of Rennell's Current, should scour out the bottom to its present depth. We all must admit the power of the ocean waves, when they make their tremendous impact on the rocky barrier that stops their career; but this power is exerted only between high and low tide levels: all below is still and motionless, save the quiet flowing of the currents that everywhere maintain a circulation of the waters of the great deep. The ship, when at the mercy of the waves that agitate the surface, may be crushed like an egg shell; but, once at the bottom, she rests undisturbed, until, in the course of natural decay, her disintegrated materials are dispersed. Either the sea-bottom between the South-West of Ireland and the Spanish coast never came to the surface after the glacial epoch; or, if it did, there was subsequent *depression*, by which, *in conjunction with denudation*, the isolation of this country was caused.

It can be proved that since glacial times there have been several oscillations of the land—our submerged forests and our raised beaches testify to the fact; and, considering how unsteady and fluctuating is the crust of the earth, when long periods of time are in question, it would be one of the greatest geological marvels that there should be no vertical movements over this area during the prolonged denudation that is supposed by Mr. Du Noyer.

The term “Hibernian” is rightly applied to a portion of our vegetation, which, in Britain, is found occurring only in Ireland. It refers only to these plants as members of the British flora, and has no reference to their origin.

Mr. Stewart, in conclusion, deeply regretted the premature and unexpected loss of a member so zealous and gifted as the late Mr. Du Noyer.

Mr. WILLIAM MILLER then read a paper on “The Glens of Antrim.” The Glens of Antrim may be defined as a district averaging about twelve miles in width, having Fairhead for its Northern extremity, and ranging along the coast for some twenty-five miles. It is seldom that we meet with attractions so great and so varied crowded into an area so limited. He who delights to note whatever is grand and beautiful in the scenery of his native land ought not to neglect the Glens, where the towering rock, mountain cataract, and gloomy defile, lend an air of sublimity to spreading valleys that open out seawards.

Nor should the student of Geology fail to visit the district. Here may be read, in unmistakeable characters, the evidence that our globe has not, at any period of its history, been a mass of inert matter. The varied sedimentary rocks—limestones, sandstones, and conglomerates; the lava outflows; the faults, landslips, caves, and raised beaches, are evidences of the stupendous forces that have been at work, moulding our country into its present form. No better region could be selected in which to study the action of these forces of nature in bygone times. This region, too, has been of considerable importance in the ancient history of our country. To testify to this fact, there still remains the ruins of over forty

castles, abbeys, and churches. The chance of seeing these, or of hearing the strange scraps of traditionary lore that still linger in the hills, will amply repay the antiquarian student.

At Layde, near Cushendall, is an ancient graveyard surrounding the ruins of the old church. Many of the MacDonnells are buried here, and tradition asserts that here were interred the remains of Ossian, the prince of Celtic poetry. The claim of the district about Cushendall to be the Morven of Ossian, and the birthplace of that poet, has long been denied by those who believe the misstatements of the translator of his poems. There is little doubt but that from the North of Ireland MacPherson obtained the materials for most of his translations. But to dispute the pretensions of Argyleshire, and to establish the claim of the Glens of Antrim to be the ancient kingdom of Fingal, and the land of Morven, there has never a pen been moved throughout all Dalriada. A culpable indifference has made Irish scholars strangers to a controversy in which the honour of their country is deeply concerned. There are still many fragments of ancient lore remaining as traditions amongst the people of Antrim; and it is little to our credit that we have no society which should, amongst other things, gather up all such material, put it in the form of a permanent record, and thus prevent its total loss.

Each branch of Irish archæology affords an ample field for investigation; and I should much rejoice to see, in successful operation, a society that would not only amass loads of flint flakes, arrow heads, hatchets, and bronzes, but which should also do the still more noble work of collecting all the remnants of our ancient history and poetry. Several interesting stories regarding old Irish worthies were met with during this visit; and there is no doubt but that a number of old people still remain in the Glens of Antrim who cherish the Celtic language, and who still treasure up the ancient poetry and traditions of the country.

The SECRETARY then read "A Quaint Descriptive Catalogue of the Antiquities, &c., in Mr. Walsh's Collection, Dromore." This was written by a working man, and it gives, in rhyme, a list of the

various objects of archæological, geological, and general interest in Mr. Walsh's possession. As an extract would not do justice to the author, the paper has been published in another form, and copies can be had from the Secretary, at 3d. each.

One of the members of the Society, from Cork, Mr. ROBT. DAY, then exhibited a choice collection of Irish antiquities, including a beautiful gold fibula, found near Cloyne, County Cork; also an Irish bronze fibula, an Indian fibula of silver, and African bronze money, all very much alike in form. Mr. Day also exhibited a case of extremely-curious gold articles, found a short time ago near Youghal, Co. Cork, but not of Irish workmanship. Mr. Day exhibited a case of glass ornaments found in various parts of Ireland, and which were decorated with spiral figures. Besides the gold and glass ornaments, Mr. Day exhibited a collection of stone and bronze articles, of great variety and value.

A unanimous vote of thanks was passed to Mr. Day for his kindness in exhibiting these articles.

During the usual discussion, several speakers strongly recommended the revival of the "Ulster Archæological Journal," and also the establishment of a typical collection of Irish antiquities for Belfast. Several members expressed their surprise that our local Museum was so imperfect in this respect, and intimated their willingness to co-operate with the Natural History Society in improving the archæological and geological departments of the Museum.

February 4th.—At a meeting, held this evening, Robert Tomlin, Esq., in the chair, LEWIS G. MILLS, Esq., Armagh, delivered a most interesting lecture on the Microscope. Having referred to the various sources of investigation available by the use of the Microscope, he recommended the members of the Society to endeavour to prepare their own objects, and not to depend too much upon purchased specimens. They would thereby avoid expense, acquire information, and make their investigations far more interesting than could be expected from any number of purchased slides. He

then enumerated the kinds of objects the beginner should devote his attention to, and explained, with the clearness of a practised manipulator, the various methods of mounting objects for the cabinet.

February 18th.—The annual Exhibition of Microscopes and Microscopic objects took place on this evening, when the members brought their microscopes, and such objects of interest as they had added to their collections during the past year. Some slides were exhibited to illustrate the practical result of Mr. Mills' instruction, and were considered most successful.

On the 4th March, a paper on "Archæic Anthropology" was read by J. S. HOLDEN, M.D., F.A.S.L., of Glenarm. He stated that the object of anthropology was not to prove the ape origin of man, as was generally supposed, but to study the natural history of man, as he was and as he is. Its present position resembles astronomy and geology in their early days, when they had to battle against popular prejudice and hereditary lines of thought, and it, like them, will triumph. Palæontology has revealed that the past life on our globe evidences an orderly succession and progression in the arrival of its numerous species, more an ideal than a perfectly continuous lineal series, as many blanks occur in the gallery of nature, "missing links," which may or may not be recovered. Yet there are enough facts to prove the transition from species to species, as the law of the animal kingdom. How does this law operate? is man's legitimate inquiry; and, as no law of nature is revealed, it must be sought for in nature itself; and just as Kelper pursued the planets through many circles and curves before he discovered their true elliptic orbits, so many theories will be exhausted before the secret law controlling animal series is arrived at. The doctrines of transcendental anatomy, first brought forward by Oken and Gœthe, that all animals are formed on one great plan, was accepted by Cuvier and elucidated by Owen, while Darwin, to explain the continuity of the plan, started the bold theory of natural selection.

Given unlimited time, the first created animal or prototype developed in every phase of life, crossed the impassable chasm between the vertebrata and invertebrata, and ever evolving upwards, rolled through fish, rodent, and monkey into man. The anthropologist accepts Darwin's facts, but not all his fancies. Man's place in nature, when viewed anatomically, is certainly next door to the anthropoid apes—though Professor Huxley has done much to bring about a reconciliation—still we don't fancy the relationship. We claim the Bosjesman, but we repudiate the gorilla. He has not our opposable thumb: his eye-teeth are like tusks, and his brain is not half the size of the little Bosjesman's. It is quite possible that some thousands of years ago the distance between the lowest man and the highest ape was less than it is now, as forms of both have become extinct. It is a singular fact that the large apes of Asia, as the orang, and the large apes of Africa, as the gorilla and chimpanzee, differ from each other by the same characters which distinguish the men of these two continents, viz: colour and cranium. The orang is brown and round-headed, like the Malay. The gorilla and chimpanzee are black and long-headed, like the negro; yet it does not follow that Darwinism should come in and allow these apes to climb to the top of our ancestral tree. Referring to the antiquity of man, Dr. H. said that marks of his presence are now found prior to the glacial period, as flint implements and weapons in the Upper Pliocene beds, and even some traces have been discovered in Miocene. During the Quarternary period he was contemporary with the extinct mammoth and cave bear, and has, to our surprise, left us, in the *debris* of caves in France and Belgium, carvings and sketches of the reindeer and other departed animals much superior to the crude designs on Celtic monuments of a vastly later date. Dr. H. gave an interesting description of the earliest human crania (inferring the savage condition of man in the mammoth and reindeer periods), also of the Danish kitchen middens, tumuli, the Swiss lake dwellings, and the late researches among the long and round burrows of England. In conclusion, he showed that the three great race types of the present day were linked with the distant past. The black, yellow, and white, or Negroid, Turanian, and Caucasian. The Negroid type representing man of the

Palæolithic age, distributed over South Africa and parts of Polynesia, at a time, says Huxley, when those remote lands formed one continuous tropical continent. If this be so, this primitive type is of an antiquity so vast as to confound calculation. The Turanian—a higher race—probably drove the last to the South, afterwards to be driven itself from Europe to the north and east of Asia. Archæic anthropology, though still in its youth, declares the vast antiquity of man. No more can the age of the human species be numbered by years, unless by years the geological strata and fossil fauna along with which man has left his remains can be reckoned. No more can the dawn of humanity be assumed as a golden age of virtue and intelligence, but as a stone age of barbarism and savagery. Nevertheless, man takes the highest place in the organic series of progression, subject to the inexorable laws of nature. As on the ocean of time successive waves of types and species have risen and fallen, have come and gone, so man has appeared, lived, and disappeared; race has followed race; and races, like species, have their day, and no more. We see the dark races of the world declining before the exterminating march of civilisation; the Caucasian is now dominant—for how long? Past analogy may indicate the future; and nature seemingly

“ So careful of the type, but no,
From scarped cliff and quarried stone
She cries—‘A thousand types are gone;
I care for nothing, all shall go.’ ”

On Thursday evening, March 18th 1869, Mr. W. H. PATTERSON read a short paper on “Some Ancient Tombstones at the Abbey Church of Movilla, Co. Down.”

The following is a brief abstract of the paper:—

You will recollect that one of our excursions of last year included the neighbourhood of Newtownards, and that one of the places visited was the parish burial-ground, which is situated about a mile to the north-east of Newtownards, on the slope of a hill at a considerable elevation above the town. The ruins of the old Abbey Church of Movilla stand in the burying-ground.

On that occasion my attention was directed to some very ancient-looking tombstones, standing in different parts of the burial-ground, and now used as headstones. Two others, which are in more perfect condition than the rest, have been removed to the garden of Mr. Jamison's house, close by, for security. All of the stones have crosses of different designs sculptured on them, either incised or in relief. One of them, evidently the most ancient of the series, bearing an incised cross and shaft, has the following inscription in the Irish character:—"ORDO DERTREND," "*A prayer for Dertrenn.*" This is supposed to be the sepulchral slab of an Abbot of Movilla, who died in the latter part of the tenth century.

The other slabs, of which there are seven at present to be seen (although I am told that some years ago there were others not now to be found), are considered to belong to the thirteenth century. They may be described as heavy flags of sandstone, tapering from the head to the foot end, and with bevelled edges. They vary much in length, some of the shortest not exceeding three feet wide, while the longer ones cannot have been less than six feet. They are very narrow, the width at the top, or broadest part, varying from 14 inches to 22 inches. The largest one, which has all the ornament in relief, has a very handsome floriated cross, with shaft, and leaves springing from the shaft, and a pair of shears curved, beside the shaft, to the right. A smaller slab, which has a very different design of cross, has also the shears to the right of the shaft.

The other stones have all crosses carved in relief, within a sunk circular panel. The shaft is incised, and, in some cases, terminates in four steps, also incised. Two of the slabs have a straight Norman sword to the left of the shaft. The actual meaning of these symbols cannot now be known with certainty; but I think the supposition is probably correct—that the sword symbolizes the man, and the shears the woman.

The Abbey of Movilla was founded by Finian about the year A.D. 540, and flourished until the suppression of the Irish monasteries in the reign of Henry VIII. The name Movilla, or, more properly, Moville, is the Irish "*Magh-bile,*" the literal translation of which is, "*The field of the aged tree.*"

On the same evening, Mr. J. H. STAPLES read a paper on "The Flaked, Chipped, and Worked Flints to be found in the Gravel in the Neighbourhood of Holywood, Co. Down."

In a gravel stretching along part of the shore of the Belfast Lough, and very well developed, in the neighbourhood of Holywood, the well-known Flint Flakes are very plentiful, and, in the same bed with these, a few rudely-chipped Celts, Spear Heads, and certain oval-shaped weapons have been found. Also, the Flint Cores, from which the flakes have been struck, are tolerably numerous.

All these flakes and rude weapons exhibit the peculiar conchoidal fracture of the Flint. The flakes are struck off at one blow, and have one side quite smooth, showing the clear fracture; the other side bears the marks of previous flakes. They are generally mere scales of flint struck off entire at one blow, but have sometimes been subsequently chipped. The cores are masses of Flint showing the marks of numerous flakes. These have been all struck nicely off in one direction, from one end of the core to the other. The Celts and other weapons can be almost exactly matched with others a little better and more highly worked, from Toome Bridge and elsewhere. They are also of the same type as those from the Somme Valley, in France, and different English gravels.

The gravels in which these flakes and weapons are found lie immediately over the glacier drift, or, where that is wanting, on the beds of New Red Sandstone. It is covered with from one to two feet of soil, and is generally at a height of three feet above high-water mark. The sea is now breaking down the bed, and strewing the contents on the beach; so that since the gravel was deposited and the weapons in it made, the sea must have receded, and again encroached on the land, and, in the meanwhile, the gravel became covered with soil.

At a meeting of the Club, on Thursday evening, 1st April—Professor James Thompson, C.E., in the chair—a paper was read by the Rev. Dr. MACILWAINE on "Sponges."

The lecturer began by an apology for his appearance before the Society to treat of such a peculiarly scientific subject. He remembered the classic maxim, "*Ne sutor ultra crepidam.*" He did not, however, appear there as a scientific lecturer at all. He came before them simply as a member of their Society, to give, in a popular way, the result of a few leisure hours devoted to the study of his subject. It was a subject of considerable interest and importance. His audience were all acquainted with it in a practical way. The Sponge of commerce had become a necessity of civilised life. The trade between these countries and the Mediterranean in Sponges alone was something very considerable. The Island of Rhodes contributed, perhaps, more than any other place to this trade. But on this branch of the subject the lecturer would refer them to an excellent paper of Mr. Patterson's in the "Popular Science Review." He had to do that evening with the nature of the thing itself. What is a Sponge? Now, to answer this question was not easily determined. From Aristotle and Pliny down to our modern naturalists various answers had been given. Is it animal or vegetable? Linnæus has classed it first among the Algæ, and finally among the Zoophytes. Even Owen was at first uncertain about its place in the organic world. It remained to Johnston (1842), and to his successor, Dr. Bowerbank, to settle this vexed question. It was now universally admitted that Sponges are animals. The next thing to do was to settle their place in the animal kingdom. This was a very low one. They stand, according to Professor Huxley, just immediately above the Infusoria, the last division in the Linnæan sub-kingdom of Radiata. Dr. Ray Greene had adopted a somewhat different classification of the lower groups. He had separated two classes from the Radiata, to which he had given the names of Cœlenterata and Protozoa. Under the last-named division—the lowest in the animal kingdom—he placed the Spongiadæ. This class was to be distinguished from the Gregarinidæ, or Gregarian Polyps. The latter, as their name implied, lived in groups together. Their common habitation, composed generally of carbonate of lime, resembled somewhat the skeleton of the Sponge in structure. The corals and corallines were poly-pidums of the Gregarinidæ. Every division here was the habitation

of a distinct polyp. The Sponge, on the other hand, was an individual. The well-known article of commerce was only its skeleton. Over this porous skeleton was spread the living animal, a homogenous mass of sarcode. This sarcode was a soft, gelatinous, flesh-like substance. Over this is a thin membrane or envelope, in which the pores exist. Entering into the sarcode and skeleton were numerous siliceous or calcareous spiculæ. The whole, in its adult state, was attached by a root, presenting that fungoid appearance which had caused it to be ranked among the Zoophytes. The skeleton seemed to be secreted by the animal in a manner similar to the shells of Mollusca. It consisted generally of a fibrous, horny substance, which had obtained the name of *keratode*. This varied, however, in character in different species. Some secreted carbonate of lime, some silica, and some keratode. The spiculæ were either siliceous or calcareous. The skeleton was only developed in the adult stage. The sarcode, or animal itself, according to Dr. Bowerbank, was nearly on a level with the most vital parts of the most highly developed organisms. It had a species of locomotive power, but no apparent organs for any specific purpose. It seemed simply a mass of cellular tissue, with no nervous or vascular system; yet it performed several vital functions, such as motion, inhalation, nutrition, and reproduction. It imbibed its food by simple contact. The water, moved by cilia, situated around and within the orifices of the pores, was inhaled, bringing the food along with it, and exhaled by other and larger apertures called oscula, bearing away the excretions. These latter orifices were also the seat of reproduction, the gemmules of the new animals issuing therefrom. The spiculæ seemed to be used for various purposes—sometimes for defence, at other times for seizing its prey. Another, and perhaps chief use, was for strengthening of the skeleton.

The lecturer exhibited a number of the skeletons of Sponges: amongst others, a beautiful siliceous one, belonging to the Museum. The latter specimen belongs to a class commonly called the "glass sponges," scientifically named "*Euplectella*," until lately but little known, and exceedingly rare. The long filaments of these Sponges exactly resemble fine-spun glass. Another rare species was noticed

and described, styled Hyalonema. This is also one of the glass Sponges; and it was noticed by the lecturer that the scientific world was indebted to two distinguished Irish naturalists for the discovery of the first living specimens of these beautiful and extraordinary animal formations. These were Professor E. Percival Wright, of Dublin, and Dr. Wyville Thomson, of Belfast—the former having dredged up a living specimen of Hyalonema off the coast of Spain, and the latter off the Faroe Islands, at a depth of over a hundred fathoms, during the last summer.

The lecturer concluded with some appropriate remarks on the bearing of such studies on the important subject of natural theology.

ANNUAL CONVERSAZIONE.

The ANNUAL CONVERSAZIONE was held on the Sixth of May.

(The following is extracted from the local Papers).

The Annual Conversazione in connexion with this Society took place in the Rooms of the Natural History Society, College Square North, and was very largely and fashionably attended. The re-union is of an exceedingly interesting and profitable character; for not only does it wind up the Club's Winter labours in Essay-Writing, &c., in town, and inaugurates their series of Summer Excursions to the country, but it also gives the members an excellent opportunity of comparing the results of their investigations, and affords to themselves, and a large number of their friends, an evening of very pleasant and profitable enjoyment. The Meeting this year was of a highly satisfactory character, and was attended by about 190 persons. The Museum was, as usual, most elaborately decorated for the occasion, the staircases were draped with a variety of banners, and the various apartments were also embellished with evergreens, flags, shields, and devices in harmony with the objects of the Society. The large room was

particularly effective, festoons of flowers and evergreens draped the ceiling and walls, while a number of bannerets, emblazoned with devices, such as the round towers, abbeys, and old stone crosses of Ireland, to signify the antiquarian department of the Club; the ammonite, with geological tools, &c., for geology; insects for etymology; and various forms of plants for botany, were suspended in conspicuous positions. A large number of chromolithographs, from the establishment of Mr. Willis, York Street; and of photographs, by Mr. Galbraith, High Street, were also displayed around the walls; the subjects of the latter were chiefly scenes in the beautiful glen at the residence of William Valentine, Esq., J.P. (Whiteabbey). Messrs. Parkes & Gedge, of Donegall Place, exhibited a number of photographic portraits; and some water-colour drawings were also sent in by Mr. Parkes, of the same firm. Mr. J. J. Murray had on view a volume of "Photographs from the Dresden Gallery," and another interesting work, relative to the sculptured stone crosses of Ireland. Mr. William Hancock showed a fine collection of plants, collected by himself in Spain last autumn, and a great variety of large photographs of Spanish scenes. Mr. Wm. H. Patterson had a good display of water-colour drawings (chiefly of localities visited by the members on their excursions). At the lower end of the room was a large collection of native ferns, the property of Mr. Malcomson; and opposite was a table covered with the peculiar productions of our Irish Pottery Works at Belleek, concerning which, it will be remembered, a paper was read before the Society during the past winter by Mr. Gray; these latter were much admired. Mr. Joseph Wright exhibited a collection of carboniferous fossils; Mr. Day, of Cork, some of "Flint Jack's" flint forgeries; and Mr. Staples a number of flint weapons from the neighbourhood of Holywood. The Marine Aquarium that occupied one of the large tables was arranged by Messrs. Wright and Swanston. It was tenanted by a variety of creatures that usually disport themselves at the sea-bottom, but which, by the gentle persuasion of the dredge, were induced to put in an appearance at the Museum on this occasion. Here were Sea-urchins, large and small; Star-Fishes, comprising "Brittle Stars" of two species, "Sun-Stars," and "Five-Fingers"; "Hermit-Crabs,"

“Spider-Crabs,” and “Fiddlers.” Here, too, was shown a living specimen of the Spiny Cockle (*Cardium echinatum*), dredged off Bangor, on the previous day. It is not unusual to dredge dead shells of this species, but it has not been previously recorded as found alive in our bay. The contents of the Marine Aquarium were viewed with considerable interest, the study of the living forms being much more instructive than an inspection of the same objects, when seen, as is usual in Museums, inanimate.

There was also on view a Fresh-Water Aquarium, stocked with a host of curious creatures, collected by Mr. Coates and Mr. William Gray, from the trenches in the Bog Meadows. Rev. Dr. MacIlwaine showed the lately-published volumes of the “Montgomery Manuscripts,” and beside it lay a section of the original manuscript, while Mr. Robert Young, C.E., had a very fine illuminated manuscript of the 14th century; it is on vellum, and the illumination and full page illustrations—of which there are nine—are all in excellent condition. The large photographic view of the Members of the Club at the Giant’s Causeway (by Mr. Mack, of Coleraine), was hung up in different parts of the Museum. Mr. Robert Patterson, F.R.S., exhibited the autographs of a number of the leading gentlemen who took part in the proceedings of the British Association at its meeting in Belfast, while much interest was excited by a collection of Silk Worms, belonging to Mr. Frederick Greer. At others about a dozen of microscopes were busily kept at work unfolding to spectators the numberless forms of the microscopic world. We must not omit to mention that much amusement was caused by a live Hedgehog, exhibited by Miss Thomson, of University Square. The collections of specimens which gained the different prizes in connection with the Club were also on view. Mr. Donaldson was successful in Mosses, Mr. Stewart in Cretaceous Fossils, Mr. Swanston in Marine Shells, and Mr. William Gray in Microscopic Slides. In the upper room Mr. Magee had a self-acting Fountain at work, which, without a head of water, threw up a constant jet; and here also Professor Thomson exhibited the Magnesium Light. On the ground floor refreshments were supplied, in unexceptionable style, by Mr. W. J. Walker, purveyor to the Club. Throughout the entire evening the Committee

were most attentive to visitors, and displayed a laudable anxiety to contribute as much as possible to the enjoyment of all present. The Sub-Committee—namely, Messrs. Gray, Robinson, Malcomson, Swanston, and Stewart, who had the getting-up of the entertainment, and who executed all the decorations, deserve every credit for their exertions. The former gentlemen, as in former years, must receive special mention. We must, however, in justice, state that Mr. Darragh, the obliging curator of the Museum, lent every assistance. The evergreens used in the decorations, and some cut flowers in different parts of the house, were from the gardens of Mr. Ritchie, The Grove. We may add that ten new members were enrolled at the close of the proceedings.



BELFAST NATURALISTS' FIELD CLUB.

SEVENTH YEAR—1869-70.

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 John M'Kee, Balmoral terrace.

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 James Phillips, Virginia street.
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 John Pim, Crumlin terrace.
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 Francis Ritchie, The Grove.
 Miss Robinson, Thorndale.
 Miss Robinson, Donegall street.
 Hugh Robinson, Donegall street.
 Ninian J. Robinson, Donegall st.
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 Richard Ross, M.D., Wellington place.
 H. Henry Samsche, University st.
 Ross Scott, Virginia street.
 E. C. Sedgewick, Holywood.
 John Shelly, Whiteabbey.
 Thomas Shepherd, Divis View buildings.
 D. Sheriff, Larne.
 W. S. Simpson, Crescent.
 Miss Sloan, College street.
 George K. Smith, Whiteabbey.

Robt. Smith, Hughes's buildings.
 Robert Smyth, Joy street.
 Rev. Geo. C. Smythe, M.A., Carnmoney.
 Adam Speers, Holywood.
 James H. Staples, Holywood.
 S. A. Stewart, North street.
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 Miss Swanston, University street.
 Wm. Swanston, do.
 Samuel Symington, Landscape terrace.
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 Dr. W. G. W. Thompson, Ballymoney.
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 Miss Thomson, do.
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 place.
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 James Wright, Fitzroy avenue.
 John Wylie, Balmoral.
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 Samuel Young, Roselands.





R U L E S

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the object of the Society be the practical study of Natural Science and Archæology.

III.

That the Club shall consist of Honorary, Corresponding, and Ordinary Members. The Ordinary Members to pay annually a subscription of Five Shillings; and that Corresponding Members be expected to communicate a paper within every two years.

IV.

That Candidates shall be proposed and seconded at any meeting of the Club by Members present, and be then elected by a majority of the votes.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, two Secretaries, and ten Members, who form the Committee. Five to form a Quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of the district. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Fortnightly Meetings be held for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These meetings to be held during the months from November to April, inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collection of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches, or excavations, if deemed advisable; provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alterations in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary, or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alterations.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.

Belfast Naturalists' Field Club.

SEVENTH YEAR.

THE Committee offer the following Prizes, to be competed for during the Session ending March 31, 1870:—

- | | | | | |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------|----|----|---|
| I. | For the Best Herbarium of Flowering Plants, ... | £1 | 0 | 0 |
| II. | For the Second Best do. ... | 0 | 10 | 0 |
| III. | „ Best Collection of Mosses, ... | 0 | 10 | 0 |
| IV. | „ Best do. Seaweeds, ... | 0 | 10 | 0 |
| V. | „ Best do. Ferns, ... | 0 | 5 | 0 |
| VI. | Best Collection of Cretaceous Fossils, ... | 0 | 10 | 0 |
| VII. | Do. Liassic do. ... | 0 | 10 | 0 |
| VIII. | Do. Palæozoic do. ... | 0 | 10 | 0 |
| IX. | Do. Marine Shells, ... | 0 | 10 | 0 |
| X. | Do. Land and Freshwater Shells, ... | 0 | 10 | 0 |
| XI. | Do. Coleopterous Insects, ... | 0 | 10 | 0 |
| XII. | Do. Lepidoptera, ... | 0 | 10 | 0 |
| XIII. | Best Set of 25 Microscopic Slides, ... | 0 | 10 | 0 |
| XIV. | Best Collection Archæological Objects, ... | 0 | 10 | 0 |
| XV. | Mr. Plimmer offers a Prize of 10/6 for the Best Collection of any or all of the above, collected at the Excursions or Field Meetings of the year. | | | |

CONDITIONS.

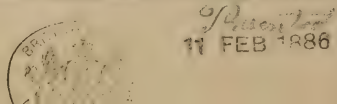
No Competitor to obtain more than One Prize in any one year.

No Competitor to be awarded the same Prize twice within five years.

All Collections to be made personally during the Session, within the Province of Ulster. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in flower, and classified according to the natural system. The Prizes to be in books, or suitable scientific objects, at the desire of the successful competitors.

SPECIAL PRIZE.

W. MURPHY, Esq., offers 10/- for the Best Collection of Native Sponges, found in the Counties of Antrim and Down during the Year 1869-70.



Presented.

11 FEB 1886



Seventh Annual Report

OF

THE BELFAST

NATURALISTS' FIELD CLUB,

1869-70.



PRINTED FOR MEMBERS ONLY.

SEVENTH ANNUAL REPORT

OF THE

Belfast Naturalists' Field Club,

WITH

STATEMENT OF ACCOUNTS,

AND

A List of the Office-Bearers and Members,

FOR THE

YEAR ENDING 31ST MARCH, 1870.



Belfast:

PRINTED AT NEWS-LETTER STEAM BOOK-PRINTING HOUSE,
55 & 57 DONEGALL STREET.

1870.



REPORT

OF THE

Belfast Naturalists' Field Club.



AT the close of the Seventh Session, your committee have pleasure in again reporting on the successful operations of the Club. The number of members now on the roll has reached 230, being about 50 more than last year. The interest taken in the proceedings of the Society has been manifested by an improved attendance at the Summer Excursions and Winter Meetings.

During the past Summer excursions were made

On	22nd May,	To Dromore.
"	16th & 17th June,	" Newcastle.
"	10th July,	" Crawfordsburn.
"	31st July,	" Massereene Park.
"	17th, 18th, 19th, & 20th August,	" Lough Erne & Bundoran.
"	4th September,	" Larne and Islandmagee.

An account of each of these excursions is appended.

The relationship and co-operation that have hitherto existed between the Club and the Natural History and Philosophical Society have been made still more intimate during the past Session. The

suggestion of the latter to hold joint meetings has been carried into effect with, we trust, a mutually beneficial result.

The following papers were read, and communications brought before the joint meetings of the Societies.

1869.

Nov. 10th.—Opening Address by Dr. Wyville Thomson, F.R.S., “On the Aims of Natural History Societies, and the Uses of Local Museums.”

“ 17th.—“The Jointed Prismatic Structure of the Giant’s Causeway and other Basaltic Rocks,” by Professor James Thomson, LL.D.

Dec. 1st.—“The Origin of Organs of Flight,” by Mr. J. J. Murphy, F.G.S.

“ 15th.—“Works of Art found in the Boulder Clay at Cullybackey,” by Mr. W. J. Knowles.

“ “ “The Hair and Colour of Human Skin as Race Characteristics,” by Dr. H. S. Purdon.

Dec. 29th.—“Glass-making, its History, and the Causes of its Decline in this Country,” by Mr. W. A. Ross.

1870.

Jan. 12th.—“A Description of an Ancient Stone Coffin, found at Movilla, County Down,” by Mr. W. H. Patterson.

“ “ “Exhibition of Continental and American Flint Implements, and comparison of them with Irish forms, by Mr. William Gray.

Jan. 26th.—“The Theory and Practice of the Ceramic Art, as now carried on at Belleek,” by Mr. R. W. Armstrong.

Feb. 9th.—“Smell and Smells,” by Rev. Edmund M’Clure.

Feb. 23rd.—“The Continuity of the Liquid and Gaseous States of Matter,” by Dr. Andrews, F.R.S.

March 9th.—“The Iron Ores associated with the Basalts of the North-East of Ireland,” by Mr. Ralph Tate, A.L.S., F.G.S., and Dr. J. Sinclair Holden, F.G.S.

March 23rd.—“On the Occurrence of the Middle Lias, near Ballycastle, Co. Antrim,” by Mr. William Gray.

“ “ “A Month on the Prairies,” by Mr. Thomas Workman.

April 6th.—“Illustrations of the Diffusion of Liquids,” by Professor James Thomson, LL.D.

“ “ “The Aquarium,” by Dr. Henry Burden.

April 27th.—“On Animal Life at great depths in the Sea,” by Dr. Wyville Thomson, F.R.S.

Abstracts of these Papers are Appended.

The Committee have also the satisfaction to report that, by the kindness of the Council of the Natural History Society, members

of this Club have been permitted to re-arrange the valuable local collections in the Museum, according to the suggestion in the Report for last year; and a large sum has been granted by the Council for cases, &c., so as to exhibit a complete local collection. Several members of the Club have been working industriously in this department during the past year, and already the local Land, Fresh water, and Marine Shells, have been named and arranged. The Herbarium is in progress, and the Geological Collection selected and named, ready for mounting. The Committee have also considered it advisable that the Club should prepare complete lists of the Fauna, Flora, Geology, and Archæology of Ulster, by publishing an annual contribution to such a work, in addition to the ordinary report—the first instalment of which (“A List of the Irish Liassic Fossils, with Notes on the New and Critical Species,” by Mr. Ralph Tate, Assoc. Lin. Soc., F.G.S., &c.), is appended to the present report. All future contributions of this nature will be illustrated when special forms have to be described.

Your Committee have also determined to provide a Portfolio for the reception of Sketches, Measurements, or Illustrations of Natural History, Geology, Archæology, &c., and they recommend that the members and friends of the Society should embrace every opportunity to multiply records of this description, to be permanently secured in the Club’s portfolio. Your Committee appointed Dr. James Thomson and Rev. Dr. MacIlwaine to be the judges of the collections sent in competition for the prizes; but regret to say that the number of competitors has not been so great as the work to be done would justify. Of the collections submitted—Miss Lester’s obtained the First Prize for Lepidoptera, and Mr. S. A. Stewart’s the First Prize for Mosses. In conclusion, your Committee, calculating upon the zeal and activity of many of the members, have every reason to hope that the Club will continue to work and prosper.

WILLIAM GRAY,	} <i>Honorary</i> <i>Secretaries.</i>
HUGH ROBINSON,	

Dr.*Belfast Naturalists' Field Club in Account with Treasurer.***Cr.**

To Balance from 1868-9,	£16	2	7	By Expenses of Conversatione,	£12	0	2
" Subscriptions,	54	5	0	" Postages,	4	11	11
" Arrears do.,	1	15	0	" Delivery of Circulars,	1	10	0
" Special Prize (J. W. Murphy, Esq.),	0	10	0	" Advertising, and Printing Circulars,	5	19	6
" Conversatione Tickets Sold,	9	1	0	" Stationery, and Printing Annual Report,	13	13	9
				" Prizes,	2	0	0
				" Curator,	3	0	0
				" Secretaries' Expenses,	0	10	0
				" Balance,	38	8	3
	<hr/> £81 13 7 <hr/>				<hr/> £81 13 7 <hr/>		

Audited and found correct,

HUGH ROBINSON.

GREER MALCOMSON, *Treasurer.*



SUMMER SESSION.



The following Excursions were made during the Summer Session :

On Saturday, 22nd May, to

D R O M O R E .

A large party visited this place by the Ulster Railway, leaving town by the twelve o'clock train. Arriving at Dromore, the party first visited the Market House and old stocks, and were surprised to find that the block of stone on which the stocks are fixed was a portion of the market cross. This latter was once one of the finest specimens of the old Irish crosses, but it was suffered to go to ruin, and the pieces were used for several purposes : one was, a short time ago, used as the foundation stone for a house built near the Market Square. It is to be regretted that means were not taken in time to restore the cross, which might have been easily done.

The party then visited Mr. A. C. Welsh, and he cheerfully exhibited his wonderful collection of Irish antiquities, and gave detailed accounts of each specimen. His collection, which has been accumulating in his family for generations, is, perhaps, now one of the best private collections in the North of Ireland. The party then visited the Moat, with Mr. Welsh as guide, who, from the summit of this very extensive earthwork, pointed out the various localities made famous by events which occurred during the troublous times of Ireland's past history. A formal meeting was

held on the Moat—John Millar, Esq., presiding. Thirteen ordinary members were elected, and Mr. A. C. Welsh, of Dromore, was unanimously elected a corresponding member. After visiting the Church, and another Rath, the party returned to town.

On 16th and 17th June, to

NEWCASTLE.

The trip to this delightful locality was looked forward to with pleasure, and was expected to be one of the most successful of the session, as to attendance and results. The weather, however, for the two days previous to Wednesday—the day appointed for the excursion—was so like November, stormy, cold, and wet, that few could think of undertaking a trip over heather, bog, and mountains, except the members of this society, whose practice is to carry out their programme independent of all weathers, and accordingly Wednesday morning found a party of ladies and gentlemen at the County Down Railway Station, bound for the summit of Slieve Donard. Leaving the station, this party left behind them the storm and rain of the previous days, the heavy clouds that still hung about Divis and Cave Hill, the smoke of factory chimneys, and the vapours of the Blackstaff, and, having passed Scrabo, and Comber, and Inch Abbey, and Downpatrick, previously visited, the party in less than two hours were safely landed at Newcastle, which, like a suppliant at a monarch's feet, lies modestly at the foot of proud old Slieve Donard, and receives from that noble mountain all that is beautiful, picturesque, and grand. More like an English than an Irish town, it skirts the sea for about a mile along the margin of the water, over which the breeze coming from off the sea, or rolling down from the mountain, swelling off fir cones and heather hills, sweeps with refreshing freedom, and glides welcome, though unbidden, through every open door and window. Calling at the Annesley Arms Hotel, all superfluous baggage was deposited,

and arrangements were made for the evening's sojourn, and then the party left for the mountain, passing through the village, with its neat cottages, terraces, and gardens, they soon reached the demesne of Donard Lodge, the residence of Lady Annesley, and situated between the village and the mountain. The grounds are not extensive, but possess a variety of scenery rarely met with within the compass of larger estates; and so close to the town that a few minutes will be sufficient to go to any part of the demesne, where scenery will be found for every taste. The wild pathless mountain peaks, and the soft green lawn; the wild purple heather, and the cultured flowery shrub; the artificial jet, scattering spray over flowers and arbours, and the rapid torrent bounding over its rocky bed with rejoicing freedom from the mountain to the sea. Donard Lodge itself nestles in a mass of richest foliage, and is surrounded by all that taste desires or wealth commands; and yonder is the lone hermit's cave, decorated with fern fronds and moss, and cheered only by the everlasting murmuring of the passing stream. Rockeries, natural and artificial, fern brakes and flowers, rustic seats and fancy bridges, fountains and spas, plantations, woods, and endless paths, with charming and extensive views over land and sea, combine to make this demesne as attractive to the visitor as it is worthy of its noble proprietor. Fortunately, these beauties and attractions are not bound by park walls and forbidding gateways. They are as free to the stranger as they are to the owner. Thanks to the generosity of her ladyship, the gates are open. No cards of admission are demanded. The Belfast merchant and the farmer's family from Kilkeel enjoy with equal freedom the pleasures of the place. Children may paddle in the stream unchecked, or ramble through the shrubbery without being captured by officious gardeners and carried by the collar outside the gate in terror and disgrace. There are no threatening notices to be "prosecuted according to law" for trespass offensively prominent at every turn: you are not so much as asked to "keep off the grass;" and hence the very confidence placed in visitors should be in itself the safeguard of the place, and a protection against that class of aspiring nobodies who would scratch their names on grotto walls, or carve

them on tables, seats, and tree trunks in the hope of thereby attracting public attention, which their abilities could not otherwise secure. And now that the railway has increased the number of visitors, all abuse of the valued privilege of free admission to this demesne should be punished by those who can appreciate it, by means more ready and effective than any contemplated by the magistrates' "Summary Jurisdiction Act." After passing through the demesne and the grove of pines above it, the real ascent of the mountain commenced, and never did a party undertake the task in better spirits or with more determined perseverance. The ladies were really more a help than a hindrance, and were the first to point out the real object of the frequent calls to "admire the landscape," or to examine some alleged botanical variety. After a scramble of two hours over boulders and heather almost as steep as a haystack, and rough as artificial rockwork, the leaders of the party proclaimed by a shout that the summit was reached, and in twenty minutes after, the last straggler arrived, each in turn calling for water, water, and satisfying their thirst from the spring-well that occurs at the very top, some 2,796 feet above the sea.

During the ascent it was interesting to mark the succession of vegetation, and the order in which it occurred. *Pteris aquilina* disappeared soon after passing out of the park. The upper limit of this fern is said by botanists to mark the highest line at which cultivation is practicable in these countries. This may be possible, but scarcely profitable unless to a Scotchman. After the brake fern ceased to appear, *Blechnum boreale* continued to the summit, and *Myrica Gale*, *Schænus nigricans*, and *Erica Tetralix* gave place to *Empetrum nigrum*, and *Vaccinium Myrtillus*, which plants, with *Erica cinerea*, covered the heath up near to the highest point, where *Salix herbacea* reigned supreme. The observant eye cannot fail to notice on Donard a sequence of plants, each group of which has well-defined limits of altitudinal range. Such zones of vegetation are known to exist everywhere, and, though in our island home they are not comparable in degree to what is seen in continental regions, yet even here they form a marked feature of our flora. Long journeys are frequently made to distant places which do not

afford such extensive or varied scenery as the ascent of Slieve Donard, from the summit of which the members of the Naturalists' Field Club had a view of the whole County Down, spread out like a garden before them. The distant hills of the surrounding counties marked the boundary; roads, towns, and villages could be traced as on a map. Rathfriland, Castlewellan, Downpatrick, Newtownards, and Ardglass, and even Carrickfergus, were distinguished. The sea looked like a great lake, showing every bay from the Skerries to Larne, the harbour of Belfast, Strangford Lough, and Dundrum Bay. The Isle of Man stood out as a central feature, backed by the hills of Scotland, which melted away with the airy distance. Southward, the mountains of Carlingford and the country beyond seemed within call, and the many cones of the Mourne range were heaped around as the consolidated memorials of primeval chaos—the pointed summit of Slieve Bingian and Bencrom, the Eagle Mountain, and the Pigeon Rock, all weather-worn and rugged, and sprinkled over with massive rocks, as pebbles cover the beach. After a survey and rest of half-an-hour, the party descended the mountain above the Eagle's Rock, and came down the glen or mountain pass, which, for its extent, would favourably compare with the celebrated Gap of Dunloe. Here and there are deep ravines, with bounding streamlets, and the murmur of falling waters hurrying from the mountains to form rivers in the plain, and all around steep cliffs, and wild massive mountain scenery. A rapid walk down the glen and through Lady Annesley's grounds brought the party again to the foot of the mountain, and thence to the hotel, where dinner was provided at six o'clock, in a style that fully sustained the high and acknowledged reputation of the Annesley Arms Hotel. After dinner, a meeting was held in the drawing-room, to which the party had adjourned for the evening, and arrangements for the next day were planned. According to which an early breakfast was had next morning, and the party set off for the day to visit the wild coast scenery by the "Bloody Bridge" and "Maggy's Leap," and gather ferns among the rocks. After spending a very pleasant day, and exploring the several caves along the coast, the whole party returned to the hotel for dinner,

previous to the departure of the last train for Belfast. As regarded the collecting of botanical specimens it was rather unfortunate that this excursion was taken so soon. Mountain plants in general are later than those of the plain ; nevertheless, the *herbaria* of some of the party were enriched by several rare species. *Salix herbacea* was found in full flower on the summit of Slieve Donard. The size of this little willow when full grown is usually one to three inches ; specimens of the latter height are considered luxuriant. The dwarf juniper (*Juniperus nana*) was found at high altitudes, covering the otherwise bare rocks with its prostrate branches, which were covered with a profusion of flowers. A number of other plants were collected, among which may be mentioned the starry saxifrage (*Saxifraga stellaris*) and *Carex pilulifera*. Near the base of the mountain, *Myosotis repens* was met with, and the sea spleenwort (*Asplenium marinum*) was found in abundance at the cliffs south of Newcastle. *Thalictrum flexuosum*, one of the meadow-rue family, is recorded by Mackey in his *Flora Hibernica* as occurring on Slieve Donard. Specimens were gathered on this occasion of the *Thalictrum minus*, var. *calcareum* ; it very closely resembles the *Thalictrum flexuosum*, and is doubtless the plant recorded by Mackey under that name. To the collector of mosses the Mourne mountains offer a splendid field ; no special search was made for these plants on this occasion, but, nevertheless, some bryological rarities turned up. *Tetraplodon mniodes* occurs on the very summit of Slieve Donard, close to the great cairn, and also on Bingian. *Hypnum undulatum*, another rare moss, was also found on Slieve Donard. On the whole, the energetic botanist, who values his *herbarium* more than his ease, will have no cause to regret a visit to the mountains above Newcastle. On this occasion, as well as throughout the visit, nothing could surpass the kindness and attention of the proprietors of the hotel, or the courtesy of the attendants. The naturalists were made to feel quite at home. Their every comfort was amply administered to. Many were surprised at the extent, excellence, and even elegance of this beautifully situated establishment, so tastefully furnished and liberally provided with all that is necessary to contribute to the convenience

or comfort of its visitors. Two such days could not be more agreeably spent anywhere, and the total cost—including railway, hotel, and all other charges—did not exceed 16s for the two days.

On 10th July, to

CRAWFORDSBURN.

By the kind permission of Sharman Crawford, Esq., a party of about fifty members and friends visited the beautiful grounds of Crawfordsburn. The grounds are not very extensive; yet they possess a variety of picturesque nooks rarely to be met with, and a number of shady walks and cool enclosures, which, at this season of the year, are as acceptable to the naturalist as to the ordinary pleasure-seeker. It is a pity that the conduct of the public, when admitted into such places, does not justify the proprietors in keeping them open. Vulgar people will too often destroy what they cannot admire, and the injury they thus indulge in causes the exclusion of themselves and many who would have the taste not only to admire what is presented to them, but to preserve the objects of their admiration. The geologists of the party had not much to interest them; but the botanists had ample opportunities for the practical study of their favourite subject. The flora of Crawfordsburn, while it cannot lay claim to any of the more rare British plants, is not by any means devoid of interest. Here are assembled quite a large group of our sylvan species. Sedges are numerous by the side of the stream, and very luxuriant specimens of *Carex sylvatica* and *Carex remota* were obtained. A kindred family, the grasses, were well represented, and embraced some good species. The tall wood fescue (*Festuca gigantea*) luxuriated in shady coverts, accompanied by the false brome grass (*Brachypodium sylvaticum*), while the slight and graceful melick grass (*Melica uniflora*) found a shelter in crevices of the steep rocks. Two St. John's worts were found, neither of which can be said to be common species: these were the

trailing St. John's wort (*Hypericum humifusum*), and the tutsan (*H. Androsæmum*). Tutsan is one of those medicinal plants, renowned of old among domestic practitioners for its healing virtues. It is widely distributed in Britain, inhabiting rocky and shady places, but is nowhere plentiful. The plant, when in fruit, shows a ruddy tinge, and its sap is then coloured red; consequently, when the doctrine of "signatures" was in vogue, it was thought to be plainly indicated by nature herself as a proper remedy for wounds. Time did not permit a close scrutiny of the sea-shore, or the above list would have been much enlarged.

On Saturday, 31st July, to

MASSEREENE PARK.

A small party left by the Northern Counties Railway at 9-30.

Owing to the unfavourable weather, and the smallness of the party, little was done beyond examining the old canoe dug from a bog near Randalstown, and now preserved in the Park grounds.

The canoe was one of many dug from the same bog, and is formed of a single piece of oak, and exhibits a fair degree of skilful workmanship, certainly such as could not be accomplished without the aid of iron tools. Measurements were taken for future reference.

On 17th, 18th, 19th, and 20th August, to

LOUGH ERNE, BUNDORAN, &c.

ON Tuesday morning, the 17th August, a party of over forty, including members and their friends, assembled at the Ulster Railway Station, in time to enable the secretaries to complete their arrangements for leaving by the nine o'clock train. The manager, Mr. Shaw, kindly provided a special saloon carriage for their ac-

commodation, and all were comfortably seated when the shrill whistle of the guard and its echo from the engine announced the departure of the train. After a quick drive of four hours past the flourishing factories of Lisburn, Lurgan, and Portadown, the ancient towns of Armagh and Clones, and the wooded demesnes that skirt the lines by Tynan, Glasslough, and Monaghan, a halt was made at the historic town of Enniskillen, through which the party was conveyed on its way to the quay, where the Rossclare steamer awaited them. The embarkation was soon accomplished, and the steamer under weigh for a trip down the beautiful Lough Erne. Above the right bank of the river stands a lofty column to commemorate the fame of Sir Lowry Cole, while the left is commanded by the military barrack and fort. Farther on, Portora school crowns the crest of a hill, at the base of which Portora Castle crumbles to the waters' edge, opposite Derrygore Cottage, nestling in the deepest foliage. Between the two the steamer passes on to the "Friar's Leap," where the lake expands and brings into view the bold outline of Devenish Island, broken by the ruins of the abbey, and one of the most perfect of Ireland's famous round towers, 80 feet high, where, thus deserted, those venerable piles with their surrounding graves are allowed to fall into decay, and cattle roam through sculptured stones and fallen tombs. Leaving Devenish on the right, the scenery of Lough Erne opens out in all its beauty, a very labyrinth of islands of every size, clothed in the richest verdure, now darkened by the shade of thick foliage, now bright with the waving crops of corn, and again partaking of the refreshing green of new-mown meadows, and, as the steamer winds its way amid them, vistas of varying beauty are opened up at every turn, affording distant glimpses of mansions and cottages, and nearer views of ruined castles and mouldering towers, and here and there the smooth surface of the water broken by crafts of different sizes, while the Rossclare Hotel stands out a central feature in the landscape, which satisfies the approaching visitors that it cannot be surpassed for the beauty of its site or the extent of its delightful prospect. Nearing the Hotel, Ely Lodge is passed on the left, peeping above the trees, and playing, as it were, hide-and-seek with the steamer around the intervening islands.

About three o'clock steam was shut off under Rossclare, and the captain of the party, with a small company of volunteers, left the ship to make arrangements for dinner, and secure accommodation for the night. H. M. D'Arcy Irvine, Esq., the spirited proprietor of the hotel, received the party most kindly, and gave them a hearty welcome to Lough Erne. Arrangements having been completed, the captain and his volunteers rejoined the ship, and all moved down the lake for Castle Caldwell, saluting the hotel as they passed. Soon after the lake expands to its greatest width—about eight miles. Over the low land to the right the mountains of Donegal can be seen, while the Poola Tooka range bounds the left extremity of the lake for a distance of about two miles in bluff escarpments and undulating sloping undercliffs, reminding the party of Cave Hill and the high ground above the Antrim Road. Distant views were had of Rockford, Castle Archdall, Riversdale, and other mansions of the neighbouring gentry, but steaming closer to the left side of the lake, a nearer view was obtained of Tully Castle, the scene of a dreadful massacre during the rebellion of 1641. After a run of about twenty-two miles from Enniskillen, the party arrived at Castle Caldwell, the residence of John Caldwell Bloomfield, Esq. Here they were shown over the museum of Indian and Chinese curiosities, collected by members of the family, and a variety of objects connected with the history and industrial resources of Ireland. Some of our Belfast antiquarians should not lose sight of the manuscripts in this collection. Mr. Bloomfield was most attentive to his Belfast visitors, and took special care to point out the principal objects in his collection, and when assembled on the lawn he presented the party with a very fine pike (*Esox lucius*), weighing over 22lbs., he had just captured in the lake. A vote of thanks was passed by acclamation, which Mr. Bloomfield acknowledged in complimentary terms, stating he was always glad to see his friends from Belfast, as the representatives of one of the brightest spots in Ireland. With a good hearty cheer returned from the shore, the steamer left Castle Caldwell at six o'clock in the evening for the Rossclare Hotel. The quiet calm of the evening was now in perfect harmony with the delightful scenery,

and as the sun sunk behind the picturesque acclivities of Poola Tooka it lighted up the landscape with streams of gold, casting long shadows from every island, enhancing the beauty of the surrounding scene, ever and anon repeated in the still receding coves and smooth bays that skirt the margin of the lake.

Arriving at Rossclare the entire party were safely landed, and walked up to the hotel, from the grounds of which the whole scenery through which they had just passed could be seen like a vast panorama before them, embracing an extensive view of surpassing loveliness. After the toils of the day, having accomplished what few things could be done in ten hours from Belfast, the party were very glad to seek the repose afforded by the hotel, and for the first time the difficulty of accommodating so large a party presented itself; but owing to the attention of the proprietor, the arrangements of the captain, and the good nature of the party, even this difficulty was overcome, and the welcome call to dinner was heartily responded to. Early in the morning the captain's whistle called for a fresh day's work, and at eight o'clock sharp signalled for breakfast. The company had previously been rambling around the pleasure ground and enjoying the delightful scenery, but soon after the summons all were ready for breakfast with far more punctuality than the attendants, who for a time seemed embarrassed by the crowd they had to provide for, and whose demands were frequently in advance of the supply. However, time only was wanting, and with that, the resources of this splendid hotel were fully equal to the emergency. True to the arrangements, cars were ready at nine o'clock to convey the party to the railway station at Irvinestown, a distance of about four miles; and thus a party of over forty left thoroughly satisfied with the visit, and convinced that no one can be said to have seen the beauties of Ireland who had not spent some time at the Lough Erne Hotel. The drive to the station passes through the beautiful grounds of Castle Irvine, and an opportunity was afforded of seeing the splendid mansion, some of the apartments of which are unequalled in Ireland. Leaving Irvinestown station the next item in the programme was a visit to Belleek Pottery. This was, perhaps, the most interesting

and striking—certainly the most popular and instructive—incident in the entire route of the Club. After a charming ride by railway from Irvinestown, with occasional glimpses of Lough Erne, on whose waters the party had enjoyed so delightful a sail on the the previous day, they arrived at Belleek, at about noon on Wednesday.

All had heard of the object of their visit—the pottery—and most of the members had been already, in a measure, acquainted with the process of manufacture there pursued, through the account presented to the Club by Mr. Gray, in January, 1869 (an abstract of which is published in the Club's annual report for 1868-69), but few were prepared for the treat in store for them by the actual visit to the spot. They had, most of them, seen specimens of the Belleek ware in Belfast and elsewhere, and admired its silvery gloss and varied hues, but could not imagine the pleasure and instruction which resulted from witnessing the actual process of its production.

Most of the party, perhaps expected to see in "the Pottery" an edifice as yet low, rough, and rural, but scarcely to find a structure beautiful in its architecture, extensive, and fully organised, giving employment to hundreds of hands.

Such, however, is the Belleek establishment, to which the Club was introduced, and in the inspection of which the members experienced a most gratifying amount of civility and attention from its highly accomplished overseer and part proprietor, Mr. Armstrong, down to the lowest workman and official. The show-room was first visited, and although, so far as walls and ceiling are concerned, as well as its general fittings, still in a rudimentary state, the exhibition of articles finished and ready for sale is at once attractive and costly. Here were found dinner services, and other articles of household use, of all descriptions, stamped with the crests and monograms of some of the highest in the land, from her Majesty's representative to many members of the nobility and landed gentry. Here were also articles of taste and *virtu* of the newest patterns and most beautiful and original designs, every one of them executed by the native artists and manufacturers of this locality.

The finest specimens of fictile art, imitating, and even rivalling, Egyptian, Grecian, and Etruscan ware, stand upon the shelves of this Irish depository, and hence, we are happy to add, are finding their way to the emporiums of art, and the dwellings of the wealthier classes throughout the entire kingdom—the Queen having, as the visitors were informed, already given more than one order for specimens of the Belleek ware. The designs of the goods manufactured for her Majesty are specially referred to, and illustrations of them given in the *Art Journal* for May, 1869.

Leaving the show-rooms the visitors were welcomed to an inspection of the works in progress, the poorest outline sketch of which would far extend beyond the limits of this passing notice.

The entire process, from the bruising and pulverising of the material to the final finish and polish of the richly-coloured and gilded finished ware, was carefully inspected and most obligingly detailed and described by those employed in the various departments. It may be well here to note, what is already known to the members of the Belfast Naturalists' Field Club, who have either heard Mr. Gray's account of the most interesting manufacture, or visited the works on the recent occasion, that the occurrence and discovery of the mineral product from which the pottery is made, on the grounds of Castle Caldwell, and that in so profuse abundance, has been the origin of this establishment.

During their visit to that most interesting old mansion on the previous day, the members were shown by its excellent and accomplished owner, J. C. Bloomfield, Esq., the first spadeful of the mineral substance, composed of felspar, quartz, and mica, which was thrown up by himself on the lands of Castle Caldwell, and which gave rise to this most important, and, we are happy to add, hitherto most successful enterprise. The material thus discovered and brought into active use, is infinitely more rich in the substance which forms the basis of the product, namely, felspar, than any hitherto discovered in Cornwall, whence the material had to be brought. It exists in the Irish locality in the greatest abundance, and of the richest quality, and to what perfection Irish hands can bring it has already been proved. It is no exaggeration

to state that the almost infant establishment at Belleek forms one of the brightest spots in the history of Irish manufacture and progress which that history has hitherto furnished.

The sight of the "hands" here engaged in this manufacture is really one of the most pleasant and hopeful imaginable. There is none of the squalor, ill-health, and pallor, unhappily so often witnessed in English, and even Irish, centres of industry. Fine, intelligent, and healthy lasses and lads are here, all hard at work, and all well-contented, well-clothed, and evidently well-fed. Some of the higher class workmen, designers and others, earn so much as £3 per week; boys who were recently apprentices, and were paid originally 2s. 6d. per week, now earn so much as £1, and even up to 35s.

The healthy locality; the fine water-power, supplied by the falls of the Erne; the energy, encouragement, and kindness of the employers, and the splendid results of the original experiments, all point to the Belleek potteries as likely, we may rather say certain, to take rank among the most successful efforts of the day wherein we live, to raise our country in the scale of manufacturing enterprise.

Again taking the train at 2-50, the party arrived at Bundoran at 3.16, and proceeded at once to Mrs. Hamilton's hotel. At first the proprietress was appalled at the number she was thus suddenly called on to accommodate, but with good humour and good management on the part of the hostess and her visitors, the latter were soon comfortably provided for, and at four o'clock the whole party sat down to a good substantial dinner, served up in a style that would do credit to any establishment. Bundoran, so quiet and lonely in the Winter, was now alive with visitors from every direction. The rocks, the beach, and cliffs, were thronged with gay groups of pleasure-seekers, and crowds of bathers disported themselves amid the foam of the breakers, or in the quiet rock pools, from morning till night; and flocks of country folk seemed to revel in the luxury of a bath, and male or female in joyous merriment went bounding to the sea. Soon after dinner, the naturalists set out on an exploring expedition, and the Car-

boniferous rocks along the coast afforded an inexhaustible source from which the geologists might collect their coveted fossils. To those who were only acquainted with the White Limestone of Antrim, the blue rocks of Bundoran were a new and interesting feature, composed almost wholly of the stems of encrinites. They furnished a better idea of how rocks have been formed by the accumulated mud of ancient sea bottoms, than less fossiliferous rocks could do ; and while imparting those primary lessons, they also furnished many forms not readily accessible to the palæontologist elsewhere. Added to which, the rugged cliffs and shelving rock masses that bound the coast line, throwing back in scattered foam and spray the heavy waves that came bounding from the bosom of the Atlantic, combined to form a scene of surpassing grandeur, and which here is as extensive as it is grand, including the full sweep of Donegal Bay, from the Southern point of Teelin Head to the Northern boundary of Classylaun. Having remained at the hotel on Wednesday night, the party, after an early breakfast next morning, spent the whole day along the beach exploring the cliffs and caves and rockpools. The latter are remarkable at Bundoran for the large quantity of the purple egg-urchin that occurs there. This sea urchin, *Echinus lividus*, as a British species, is peculiar to Ireland, and is only found on the West coast, its Northern range being Bundoran, where it was first noticed by the late Mr. Hyndman, of Belfast. It is about two inches in diameter, and has long spines of a purple colour. Its peculiarity is that it burrows in the rock, scooping out a hole for itself where it is secure from the influence of the breakers, and every rock-pool contains dozens of them. The beauty of the *echinus* suggested to the artists of Belleek the idea of adopting it as the pattern from which the Queen's ware was manufactured, and the successful application of the design fully justifies the selection. A variety of other specimens were also collected, including a large number of the *Trochus lineatus*, not found in the neighbourhood of Belfast, but locally abundant at Bundoran. Several specimens of the common snail (*Helix aspersa*) were also collected, having reversed whorls. The common form occurs in large quantities, and is sold by children on the

beach, strung together for necklaces, &c. The variety of objects thus met with during the day furnished ample subjects for conversation at the tea table, and some of the gentlemen present gave interesting popular descriptions of them for the benefit of the company.

On Thursday evening, Mrs. Hamilton requested the visitors to allow a local photographic artist to take a picture of the group, and this was readily agreed to as an interesting memorial of a most pleasant and successful excursion, and the company were most anxious to oblige Mrs. Hamilton, who so liberally provided for their wants, and by whose kind attention they were each and all made to realise that ease, home comfort, and thorough satisfaction which is so desirable to, but not always the lot of, either the scientific explorer or the pleasure-seeking excursionist.

Early on Friday morning the captain's whistle made the whole house astir, everyone being anxious to make the most of the short time left at their disposal ; breakfast was soon disposed of, and at ten o'clock the whole party were again seated for the return journey to Belfast.

The long delays at the principal stations broke the monotony of the journey, and enabled the members of the party to have more time for investigations ; thus the glacial striated markings were noticed in the gravels at Pettigo, the fossils of the limestones at Bundoran Junction, and the interesting views of the Abbey, Tower, and Cross at Clones. Nearly two hours were available at this station, amply sufficient to see the old cross in the Market Square, in fair preservation, the Abbey with its surrounding quaint tombstones, the Round Tower, tolerably perfect, yet indicating the process of decay, and the Dun or Fort, from which an extensive view is obtained of the town, its antiquities, and the surrounding country. The usual form of electing new members was then gone through, which was the last item in the programme so admirably arranged and successfully carried out, and for which a hearty and unanimous vote of thanks was passed by acclamation to the captain of the party, and another to the ladies who accompanied them, and added so much to the pleasure of a trip successfully terminated on the arrival at Belfast at 6.45 on Friday evening.

On 4th September to

LARNE AND ISLANDMAGEE.

The last excursion for the season took place on the above date, when a party of about forty visited Larne and Islandmagee, arriving at Larne by rail. The party proceeded at once to examine the flint-gravel or raised sea beach, of which the Curran is formed, and which was accumulated probably at a time when the sea in what is now Belfast Lough was connected with the water in Larne Lough, and when Islandmagee was really an island, which it is not at present. This flint gravel is remarkable also for the large quantity of what are known as "flint flakes" which it contains. These flakes are most interesting to antiquarians. The circumstances under which they occur in England and the Continent are frequently referred to, and considered by many sufficient to prove that man must have existed many ages before the time of Adam. These flakes occur very commonly throughout Ulster, particularly in the counties of Antrim and Down, where they have been found in large quantities by members of the Field Club. At Larne they occur all over the surface of the gravel. The latter is some sixteen feet deep, yet the flakes or wrought flints are never more than about three feet deep, or to such a depth as they might have been conveyed by agricultural operations. They may have been the chips or refuse from a manufactory of flint arrow-heads, so common in this locality, or they may be even of a later date—the refuse from gun-flint factories. At all events, they are here very abundant and exactly similar to the forms found on the Continent, which have given rise to the Pre-Adamite theory. Leaving the gravels, the party crossed the ferry to Islandmagee, and proceeded to the Cromlech, on the hill—a very good but small specimen of this class of ancient monuments. It occupies a novel position, being quite close to a gentleman's cottage. Here the usual field meeting was held, and several new members elected. The Vice-President, John Anderson, Esq., F.G.S., introduced Ralph Tate, Esq., F.G.S., &c., to the meeting, and then, adjourning to the Iron Mine close by, Mr. Tate gave a very interesting description of the Iron Mines

of Antrim, which have recently opened up new fields of industry. The ore is always found in connexion with the Trap Rock, and is, in fact, the result of metamorphism or the decomposition of the trap rocks, and occur in the form of lithomarge, bole, and pisi-form magnetic ores. The Islandmagee section shows the passage from one into the other very clearly, and in this respect is a good example of what occurs elsewhere throughout Antrim. The mine at Ballypallidy is, however, an exception, for here it would appear the ore has been altered, and again laid down as sedimentary deposits, in which members of the Club have for some years found the remains of plants, &c., indicating a period of rest in the volcanic activity during the Tertriary epoch. The iron ore of the Antrim mines is, therefore, altogether different from the true iron ore of the Carboniferous age, and could not like the latter be profitably smelted by itself. It is, however, found very useful in reducing the richer ores of England and Scotland.

From the Iron Mines the party passed on to the "Rocking Stone," in Brown's Bay, where a halt was called to talk over the old stories about the evil doings of witches in this neighbourhood in former days.

The more energetic of the geological section, on leaving the "Rocking Stone," betook them themselves to a bed of Lias rock that crops out on the western shore of Islandmagee, some three miles from the lighthouse. Ralph Tate, Esq., F.G.S., formerly Honorary Secretary of the Club, has at various times carefully examined this bed, and the results have been communicated to the Geological Society of London, in an able paper co-relating the Islandmagee Lias, with the *Ammonites angulatus* zone of the Lower Lias. This bed yields abundance of fossils, several of which were unknown to palæontologists until described from this locality. A very full list accompanied the paper referred to, and will be found in the "Quarterly Journal" of the London Geological Society, Nov., 1867. The working party had, on this occasion, the great advantage of the assistance and guidance of Mr. Tate, and they succeeded, by dint of perseverance and hard hammering, in securing representatives of a considerable portion of the large assemblage of

species found here. Many good specimens were obtained of the more common and characteristic fossils, and a large number of the rarer forms. Among the latter was *Lima Hettangiensis*, which had not until this occasion been met with in Ireland. The following may be cited as the most interesting of the species found on Saturday:—*Ammonites angulatus*, and *A. Johnstoni*, *Pleurotomaria similis*, *Littorina elegans*, *Cardinia Deshayesi*, *Myoconcha psilonoti*, *Cardita Heberti*, *Lima Terquemi*, *L. pectinoides*, and *L. Hettangiensis* *Terquemia arietes*, *Pinna folium*, *Pleuromya Galathea*, *Waldheimia perforata*, and *Montlivaltia Haimei*. The above list does not embrace one-half of the species found, but it will suffice to prove that, in this locality, the seas of the Lower Lias possessed a very varied fauna, and were tenanted, especially by mollusca, in abundance.

The results of this day's work were highly gratifying to the botanical collectors. The northern end of Islandmagee and the neighbourhood of Larne constitute a district that well repays the botanist for a painstaking search. Quite a large number of scarce plants are to be found there, and expectation was even exceeded on this occasion. The botanical rarities collected make quite a good list for one day's work. A handsome plant found close to Larne was the lucerne (*Medicago sativa*). It was growing in company with the slender lotus (*Lotus tenuis*); the latter has usually been reckoned as only a variety of *Lotus corniculatus*, but it has a very different habit, and structural characters of its own, sufficient to rank it as a distinct species. Neither *Medicago sativa* or *Lotus tenuis* has been previously found in the North of Ireland, and only one Irish station is assigned to each by the *Cybele Hibernica*. The field melilot (*Melilotus arvensis*) was also found close to Larne. This is another plant that is very rare in this country: it has only once before been found in the North of Ireland. Another good "find" was the wild mignonette (*Reseda lutea*), a rare Irish plant, which does not occur in the North except at Larne. The Water Parsnip (*Sium angustifolium*) was found on Islandmagee, as was also the swines cress (*Senebiera Coronopus*), and last, not least, the beautiful grass of Parnassus (*Parnassia palustris*). *Fumaria palli-*

diffusa, and *Convolvulus arvensis*, both rare plants, were found plentifully on the gravels at the Curran, at Larne. Many other species of less importance were collected, or noted, but to those interested in botanical matters, the above list will abundantly suffice to prove that the last excursion of the Club for this session was well chosen and eminently successful.

NOTE—The authors of the various papers, of which abstracts are here appended, are alone responsible for the views expressed in them.





WINTER SESSION.

AT the commencement of the Session, a new arrangement was inaugurated : The Natural History and Philosophical Society, and the Club, which had previously held their meetings separately, then joined their forces for the reading of papers and delivery of lectures. The first of these joint meetings was held on

Wednesday, 10th November, when the Opening Address was delivered by Dr. WYVILLE THOMSON, F.R.S., President of the former Society, on "The Aims of Natural History Societies, and the Uses of Local Museums." The lecturer gave an outline of the history of both societies, with a sketch of what each had accomplished, and the reasons that influenced the leaders of both to urge a future united action, while preserving each its own individuality and peculiarities. He pointed out, that as a typical collection, illustrative of natural history, had, during the last fifteen years, been gradually formed in the Queen's College, Belfast, the special object to be now held in view by the Belfast Museum was the perfecting within its walls, local collections that would worthily and thoroughly represent the fauna, flora, geology, and antiquities of the North of Ireland. The lecture was received with marked attention. Mr. Alexander O'D. Taylor, the senior secretary of the Natural History Society, afterwards explained in detail the progress which had been made in re-arranging and re-naming the various collections by members of the Club. Each department was being taken up *seriatim*, and put in thorough order for reference.

As Dr. Thomson's address has already been published *in extenso*, and issued to the members, it is unnecessary to insert an abstract of it here.

On Wednesday evening, 17th November, Professor JAMES THOMSON, LL.D., read a paper on "The Jointed Prismatic Structure of the Giant's Causeway, and other Basaltic Rocks." He stated that the opinions prevailing among geologists as to the manner in which the jointed prismatic structure in basalts and other igneous rocks has arisen, involve generally one or other, or a combination of both of the two following principles:—1st. Prismatic fracture by shrinkage in cooling, like the cracking which may be observed in starch or mud, in drying:—2nd. An assumed spheroidal concretionary action of the lava or basalt in solidifying from the molten state. He had accepted, as appearing to be *a part of the truth*, the supposition of prismatic fracture by shrinkage in cooling: and, about seven years ago, had offered a theory of the origin of the jointed prismatic structure, involving primarily that supposition; and which had been suggested or indicated to him by certain phenomena which he had observed in the stones of the Giant's Causeway.*

This theory, although having one fundamental supposition in common to it and to some other views which had been previously put forward, yet in other respects was altogether divergent from any such previous views. Whatever other attempted explanations of the jointed prismatic structure he had met with, indeed, appeared to him to be plainly and decidedly untenable. All that he had met with, whether founded on the supposition of prismatic fracture by shrinkage, or of spheroidal concretionary action, or of both together, appeared to him essentially to involve incongruous or

* He had submitted this theory to the Belfast Natural History and Philosophical Society, in a paper read on November 26th, 1862; and had shortly afterwards brought the matter under the notice of the British Association, at the Newcastle meeting, in 1863, and a brief account of the chief points is to be found printed in the transactions for that year.

impossible suppositions, or else to be quite vague and unsatisfactory.

As for the spheroidal concretionary theory, he believes it to be founded on a total mistake. He regards the spheroids, so often met with in decaying basalts or lavas, as being not concretions at all, but as being the results of decay or decomposition penetrating from without inwards in blocks into which the rock has been divided by fissures, which may have arisen from various causes. From this, and other reasons, which in his lecture he stated at length, he is led to give no credence whatever to the spheroidal concretionary theory of the jointed prismatic structure.*

* To describe adequately and to discuss the views of the principal geologists on the jointed prismatic structure and its origin, would greatly exceed the limits to which the present abstract must be confined. The annexed references at the end of this note to passages in the writings of several geologists will, however, serve sufficiently to guide to all the principal views on the subject, as expressed by writers who themselves have proposed or maintained them : or have, at least, promulgated them with favour, though in some cases with vagueness—the natural result, as it appears to Professor Thomson, of attempting to explain and propound intrinsically untenable views. Sir Charles Lyell's writing, for instance, in his *Elements of Geology*, under the heading *Columnar and Globular Structure*, while appearing to put forward with favour the spheroidal concretionary theory, appears also to be affected with this character of vagueness. Dr. Daubeny, Beete Jukes, and several others, with much more boldness maintain the spheroidal concretionary theory, under various modifications of its details; while Mr. Scrope repudiates it, denying that the columnar structure could have had its origin in spheroids pressing against each other, and maintaining that the columns have originated through "fissuring" of the hot rock, by "contraction" during its process of "consolidation" or "refrigeration;" and accounting for the cross-joints in a way which will be alluded to in a following note in this paper, and which the writer, Professor Thomson, considers to be without doubt totally untenable.

REFERENCES.

- Daubeny, *On Volcanoes*. 2nd Edition, 1848. pp., 65, 78, 79, 660, 661, and 680.
 Scrope, *on Volcanoes*. 2nd Edition, 1862. pp., 93 to 106.
 Lyell, *Elements of Geology*. 6th Edition. 1865. pp., 610 to 613.
 Jukes, *Popular Physical Geology*. 1853. pp., 109 to 113.
 Page, *Advanced Text Book of Geology*. 2nd Edition, 1859. p., 72.
 De La Beche, *Geological Observer*. 2nd Edition, 1853. pp., 404 to 407.
 Dana, *Manual of Geology*. Revised Edition. 1865. pp., 97 to 99, 626 and 627.
 Carl Vogt, *Lerbuch der Geologie*. 1854. Vol. II., p. 223.

The chief points of his own theory may be briefly sketched out as follows :—He supposes that the division into prisms has arisen by splitting—through shrinkage—of a very homogeneous mass in cooling : and that the cross-joints are fractures, which have commenced in the centre of the column, and have advanced to the outside, as a circle increasing in diameter.* This mode of fracture, he thought, was evidenced by various markings and other indications on the stones. They usually show a remarkably symmetrical conformation round the outer parts of their cross-joint faces, presenting an appearance which had struck him as being like a complete circular conchoidal fracture, often with roughly-figured rays from the centre, such as in the ordinary conchoidal fracture are seen emanating from the point where the blow has been struck.

Now there are not many very distinct ways in which we can suppose a fissure to have spread across a column or prism of solid stone. First, if we for a moment suppose the fissure to have

* *The cross-joints* he thus takes to be *posterior to the prismatic fissures*. But according to the spheroidal concretionary theory they are supposed to be contemporaneous in origin with the prismatic faces of the columns, both the longitudinal faces and the cross-joint faces being in that theory supposed to be different parts of the surfaces of spheroids growing larger in solidifying till they meet, and can grow no more ; or till they “press against each other” and “squeeze” themselves together, so as to receive flattened faces, instead of a rounded form. And according to the views of some who maintain the supposition of prismatic fissures by contraction, and deny the spheroidal concretionary theory (Mr. Scrope, for instance—*Volcanoes*, 2nd ed., 1862, p. 104) the cross-joints are supposed to be contemporaneous at each part of the length of the column, with the prismatic fissures at that same place ; the cross-joints being supposed to be successive bounding faces between the solidified end of the column and the as yet molten lava, into which the solidification is advancing, and the prismatic fissures being supposed at each period to extend quite forward to the molten lava. Mr. Scrope’s view, as he himself states in the passage referred to, comprises the supposition that the concavity of the ball-and-socket-like cross-joints ought to be always directed upwards ; or, in other words, that each separate piece of the jointed column ought, according to his supposition, to have its bottom convex and its top concave. This supposition is not verified but is decidedly controverted by the basaltic columns of the Giant’s Causeway, the cross-joints being often concave upwards, and often concave downwards, and often nearly flat.

begun at one side of the column, and to have advanced across to the opposite side, we must expect to find the resulting fracture quite unsymmetrical, and presenting very different appearances at the places where it entered the previously unbroken stone prism, and where it came to its termination, leaving the column broken behind its advancing front. We find no such appearance; but, on the contrary, we commonly find a very remarkable appearance of approximate symmetry of character in the cross-joint, with respect to the different sides and angles of the column. Perfect symmetry is, of course, not to be expected, as the columns themselves are often far from being of any regular or symmetrical form; but so far as Professor Thomson's observations of the stones in the Giant's Causeway have extended, he believes no appearance is to be found indicating an advance of the fissure across the column, from one side to the opposite, in any of the joints which exhibit, in other respects, the usual remarkable features. There may, no doubt, be numerous cases of fractures due to shattering, by causes different from those which have produced the ordinary remarkable joints. Next, any idea that the cracking of the column could have simultaneously begun all round the circumference, and advanced to terminate in the centre, requires little more than to be brought before the mind for consideration to be rejected as untenable. There seems then to remain nothing to suppose but that the ordinary cross-joint fissures came into existence, first in the interior of the column, and then flashed out towards the circumference.

In order to produce the cross fractures, commencing in the centre, he supposed that a longitudinal tensile stress must have existed in the middle of each column previously to the cracking of the cross-joints. To account for such a tensile stress, he suggested as a probable hypothesis, that after the column was formed, chemical action, caused by infiltration of water, might cause an expansion of the outside of the column, and that the outer part, thus growing longer, would pull the internal part more and more intensely, until at last the internal part would give way, and break into short lengths. The fissures thus formed, it is obvious, must stop short without extending quite to the outside of the column, as the pull

causing the fracture in the interior is due purely to longitudinal push in the outer part of the column. That outer part, therefore, will not be subjected to the pull at all, and so the enlarging circular conchoidal fracture should be expected to stop short without penetrating to the outside of the column, especially at the angles. On the event of the central part cracking, and so ceasing to bear a pull, the outer part being less resisted than before, would increase in length in the immediate neighbourhood of the new internal fissure, and so would bring parts nearer the circumference than before into the condition of being subject to a pulling stress. Also, the reverberation or tremor at the instant of the cracking might, it seems reasonable to suppose, carry the advancing circular edge of the fissure somewhat farther out than the region which would be subjected to a pull if the action were slow, instead of being by a start. The appearances of the cross-joints, with the central area of each like a circular or oval flattish face, or like the convex or concave form of a watch-glass, but not extending out quite to the angles, and usually not quite out to the sides of the columns, seem to be in accordance with the suppositions here made, and to give considerable corroboration to them.

The cracks, if formed as supposed, without extending quite to the outside of the column, would constitute places of weakness, from which, under the shattering influence of earthquakes or other causes, fresh fractures would readily proceed quite to the outside, severing the columns completely across ; but these fresh fractures occurring in ways quite different from those in which the original circular ones had done, could not be expected to be in continuity with the supposed original circularly terminating fissures. Thus is accounted for, the approximately circular outer boundary to the flattish or lunette-shaped middle part of the cross-joint, which is very commonly to be seen.

On a recent visit to the Giant's Causeway, in the Summer of 1869, Professor Thomson had noticed some phenomena tending to confirm his views. He met with several instances in which a small mass of stone, different in texture and in hardness from the rest of the basalt, showed itself in the cross-joint

of the column; and in which the joint presented to his view the appearance as if the cross fracture had originated at and spread out from this spot of irregular quality. When this extraneous or irregular lump happened to be near the middle of a column, there appeared to emanate from it, in all directions, approximately straight but roughly-formed rays; and when the lump happened to be near one side of the column, the rays emanating from it spread out from it in curved forms like a brush, and the several rays in proceeding outwards seemed to bend gently somewhat towards the nearest external face of the column. This seemed as if they had tended to run so, as at each moment, to be advancing in a direction approximately perpendicular to the advancing circular or oval edge of the enlarging fissure. If a fracture originating at one side of a column, were to advance across to the other side, and in so doing were to cut across any irregular lump in the mass, that lump would leave a kind of tail extending from itself forward in the direction of propagation of the fissure; but the part of the fissure formed before arriving at the lump would be scarcely at all influenced by the presence of that irregularity. A tail emanating in this way from an irregular lump or a vesicular cavity, and extending forward in the direction of advance of the crack, is continually to be noticed in the breakage of flints, glass, basalts, and other brittle substances.

But the cases noticed at the Giant's Causeway, in which, from an included lump, the lines radiated out in various directions, and were curved when the lump was eccentric, tend to corroborate the supposition that the fissure had its beginning at the irregular lump, where some local weakness or overstraining might exist, and that it flashed out from thence towards the circumference of the column.

In the discussion which ensued on the reading of the paper, an interesting case was adduced by Mr. Gray in support of Professor Thomson's facts and arguments for proving that the 'spheroidal structure in successive coats, resembling those of an onion, so frequently manifested in decaying basalts, is not an original concretionary structure, but is due to decomposition penetrating from without inwards, in blocks or fragments, into which the rock has

been fissured. The case adduced by Mr. Gray was that of a stone celt, which showed clearly the formation of one or more coats, evidently due to decay penetrating inwards from its artificially-formed surface. He subsequently, at the Annual Conversazione of the Club, exhibited the stone axe to which he had alluded, and which showed a remarkable similarity to the decomposing spheroidal masses, commonly thought to have received their spheroidal laminated structure by original concretionary action, while solidifying from the molten state. But in the stone axe, no such supposition could be for a moment entertained, as no original concretionary structure could grow from a central nucleus outwards in a mass of basalt, so as to have coats already existing in it of the exact form of a stone axe, with sharp edge, before the bringing out by the hands of men of the special form designed for them for their own requirements.

On Wednesday evening, 1st December, a paper was read by Mr. J. J. MURPHY, F.G.S., on "The Origin of Organs of Flight." Thought not an adherent of Darwin, he took the development theory as proved, and proceeded to apply it to the organs of flight. Perfectly developed wings were found in four classes of animals—birds, bats, pterodactyles (a race of flying reptiles, found only in a fossil state), and insects. But there are races having an imperfect power of flight, by means of membranes stretched along their sides, which serve as parachutes, and by means of which they take long, gliding leaps. The flying squirrel is one of them, the flying opossum another, and the flying lemur a third. Specimens of these, from the Queen's College Museum, were exhibited.

Mr. Murphy agreed with Darwin that the origin of the bat's wing was probably such a membrane; and he thought the same of that of the pterodactyle. Specimens belonging to the Belfast Museum were exhibited of the *draco*, a small lizard, which has a somewhat similar membrane, and uses it in the same way. Mr. Wallace has lately discovered, in Borneo, a tree frog, which has the same power of gliding through the air, by means of its enormously large webbed

feet. All these gliding animals inhabit trees, and it is a life among trees that makes their power of taking very long gliding leaps of use to them. The flying fish is another animal with imperfect power of flight, but it is not a gliding animal, according to Mr. Wallace, an excellent observer—it really flies. Birds have no vestige of a side membrane, and therefore most probably never were gliding animals, but moved their wings from the first, as also did insects.

On Wednesday evening, 15th December, Mr. W. J. KNOWLES read a paper, entitled, "Works of Art found in the Boulder Clay at Cullybackey." He described a number of curiously-shaped stones found in a road-cutting, at a depth of 18 feet, near Cullybackey, a few years ago, some of which were so perfectly formed that they looked like works of art; also, some stones of nearly similar shape found in a well sunk for the Rev. Mr. Gray, in the end of the past Summer, at the U. P. Manse, Cullybackey, and a piece of wrought wood, found in the same well, at a depth of 32 feet. The stones found in the cutting are of soft, finely-laminated sandstone. The majority of them are evidently waterworn, but some of them have the appearance of having received an artificial finish, especially one circular stone, and another of globular shape, with a knob on it, which he described minutely and exhibited to the meeting. Wrought wood was said to have been found in the same cutting, and one piece was exhibited; but, owing to the workmen having cut it in various places, the marks of original workmanship, if any were on it when it was found, could not be distinguished from the recent markings.

The stones from the well are of similar material to those from the cutting. Some of them are grooved and scratched, showing signs of glacial action, and some of them when broken up have impressions of leaves between the layers.

The well had to be sunk to the rock before water was procured, and the depth is 37 $\frac{1}{2}$ feet. There was the ordinary unstratified Boulder Clay, or Till, passed through to the depth of 30 feet,

when a layer of gravel, a few inches thick, was reached. The remaining portion was tough unstratified blue clay, containing scratched and grooved stones, waterworn pebbles of sandstone, chalk, basalt, &c., and lumps of lignite. At the depth of 32 feet, and below the layer of gravel, the piece of wrought wood was found. It is about 3 inches long, and $1\frac{1}{2}$ inches in diameter, irregularly four-sided, and appears to be a portion of a stake. The marks are evidently made by a sharp instrument, and are so distinct that Mr. Knowles had doubts of its being found at the depth mentioned; and, though it was only a short time from it was found till it was in his possession, he instituted, by the aid of the Rev. Robert Gray, a very searching inquiry into all the circumstances connected with the finding of it, the result of which was that all doubts of any imposition were removed. On further examination of the wood, he found the marks on it to be of a peculiar kind. There are the ordinary heights and hollows produced by the tool when fashioning it into shape; then over the whole surface there are marks like striæ, but raised above the surface of the wood, instead of being sunk into it.

Mr. Knowles stated that he had made several experiments in order to produce marks of a similar kind, and he found that flint flakes which he had struck off for the purpose, when used to scrape wood slightly charred, produced marks of the same kind. He exhibited pieces of wood which he had operated on with the flint flakes, showing the likeness in the marks he had been able to produce to those on the fossil wood. By the process of scraping, minute indentations were made in the fine edge of the flint, which, in turn, left the raised marks on the wood. In conclusion, he stated that he believed the piece of fossil wood to be part of a stake, fashioned by man with flint tools, and that it presented evidence of man being pre-glacial.

On the same evening a paper was read by Dr. H. S. PURDON, Physician to the Hospital for Skin Diseases, Belfast, on "The Hair and Colour of Human Skin as Race Characteristics." Dr. Purdon's

subject was a very interesting one, especially at this period, when ethnological science is occupying the attention of the best naturalists of the day.

He endeavoured to examine the theory which made the colour and constitution of the Hair, Beard, and Skin, a basis for the classification of the various races of men in the world.

In his connection with the Hospital for Skin Diseases, he had noticed many abnormal cases of skin and hair changes, and he threw it out as a suggestion, that the diseased conditions of these organisations might, in some measure, explain the variations effected in them by climate and other natural influences.

The effect of the nervous system on the deposit of pigment in the skin and hair had, hitherto, been hardly touched upon. The case of the Albinos, with their highly sensitive organisation, and accompanying lack of colour in both hair and skin was one in point. The condition of the nervous system here seemed to prevent the deposit of any colouring matter. The remarkable effects of grief and mental anxiety, of which numerous cases have been recorded, on the colouring matter of the hair, was also a support of the theory of nervous influence. He, himself, had met such a case, where both the skin and hair on a portion of the body were blanched in a very short period by excessive mental anxiety. How far the colour of the skin and hair was to be taken as a race characteristic, it would be hard to say. One thing, however, was certain, that some of the best ethnologists of the day regarded it as a very distinctive feature of race. For his own part, the lecturer thought that climate and other natural influences were quite sufficient to account for the variations in colour to be found in the skin and hair of the different races of the globe.

On Wednesday evening, 29th December, a paper was read by Mr. W. A. Ross on "Glass-making : its History, and the Causes of its Decline in this Country."

Mr. Ross gave a very interesting account of the several processes of glass-making, the materials necessary, and the tools em-

ployed, detailing more especially his personal experience in the glass works of Belfast. He also exhibited some elegant specimens made in Belfast, and compared them with Continental works. After giving a history of the glass-making trade in Ireland, and enumerating the several works formerly in operation, he stated a number of facts in proof of his opinion, that the decline of the trade in this country was not owing to foreign or English competition, so much as to the uncertainty of workmen, and their trade combinations.

On Wednesday Evening, 12th January, Mr. W. H. PATTERSON communicated the following Notice of an Ancient Stone Coffin, found at Movilla, County Down.

"Some years ago a curious stone object was dug up in the burial-ground which surrounds the ruins of the old Abbey Church of Movilla, near Newtownards, Co. Down. It was found under the following circumstances :—

"A gentleman living in the neighbourhood, wishing to construct a family burial vault, had an excavation made to the depth of eight or ten feet, until the solid slate rock, which underlies the clay of the cemetery, was reached. At the bottom of the excavation, resting on the rock, was found the large stone coffin to which the present notice refers.

"The finder had the coffin removed to his own house (between one and two miles distant from Movilla), where it still remains, on the lawn, in front of the hall door. The measurements are as follows :—Length, 3 feet 8 inches ; width, 2 feet 8 inches ; height, 1 foot 10 inches. Inside measurements—26 inches long, 14 inches wide, and about 15 inches deep. Its general appearance is that of a clumsily-made oblong trough, on which the only attempt at ornamentation consists of some shallow panels worked on the outside.

"Within the upper edge there is a ledge, sunk about an inch, which may have been for the purpose of receiving a stone lid.

"My attention was directed to this curious object by Mr. Jamison, of Movilla, a gentleman who has been instrumental in

preserving from destruction some of the mediæval cross slabs which still exist there, and which attest the former importance of Movilla as an ecclesiastical establishment.

"The abbey of Movilla was founded by Finian about the year 540, and existed down to the time of the suppression of the Irish abbeys in the reign of Henry VIII. The place is mentioned in the Annals as having been frequently burned and plundered by the Danes. Its situation, close to the North-Eastern sea coast, and on the neck of land between the loughs of Strangford and Belfast, rendered it particularly vulnerable to these predatory attacks. The coffer, when dug up, was considered by those who first saw it to be the old font of the abbey; and, if this supposition be correct, considerable interest must attach to it from its dissimilarity to the ordinary forms of baptismal fonts. The oblong form and large size would, I think, point it out as a very early type of font."

"If a font, I can understand the peculiar conditions under which it was found, by supposing that it was hastily buried, for security, on the approach of some party of Danish pirates, and that the secret of the place of its concealment perished with those who thus endeavoured to preserve it from desecration.

"An antiquarian friend, who lately examined this object along with me, suggested that it may have been the base of a sculptured cross, and that the hollow part was the mortice, in which the end of the cross stood. This I do not think very likely, as the entire size of the block would be totally disproportionate to the large socket; in fact, a cross to have stood in this base would require to have a shaft or stem 26 inches wide, by 14 inches thick, and would have been of such a weight as to have burst out so frail a base, if the cross got the slightest lean to either side.

"The only other purpose that I can imagine this object to have served was that of a chest or coffer, perhaps for the safe-keeping of some of the church valuables; in this case, it must have been fitted with a heavy stone lid. I am myself disposed to think that this curious object is a font; but, as some of my fellow-members may have met with similar antiquities in the course of their re-

searches, and may have settled the question as to their original use, I shall not be surprised to find that I have been mistaken."

Mr. WILLIAM GRAY then exhibited a very large collection of Flint Implements, from France, Denmark, America, &c., and compared them with our Irish forms. The square-sided celts and gouges of Denmark, and the beautiful flint daggers, differ most widely from the Irish forms, yet the style of clipping the flint was quite similar.

The exhibitor proved that, whatever may be the mode of chipping the flint, the character of the work done depends more upon the nature and peculiarity of the material than upon the manipulation.

The Rev. John Scott Porter gave a very interesting account of the Irish flint weapons, and exhibited a very fine series from his private collection. Rev. James O'Lavery, P.P., contributed very much to the interest of the evening by the manner in which he referred to the several points under discussion.

On 26th January, a paper was communicated by Mr. R. W. ARMSTRONG, on "The Theory and Practice of the Ceramic Art, as now carried on at Belleek." In the unavoidable absence of Mr. Armstrong, the paper was read by Mr. A. O'D. Taylor. It gave a brief historical outline of the ceramic art, as practised in various countries, from the remotest period of which we have any record. Statements in the Old Testament, extracts from Diodorus Siculus, from Homer, and from Chinese chronicles, were given, showing the antiquity of the art, and the high estimation in which it was held. That branch termed "fine pottery" was specially noticed; this includes, under the term "White ware," the compositions known as Delf, Stoneware, and Porcelain. The first is a porous bibulous body, which, only for the thin film of glass with which it is covered as a glaze, would absorb fluid matter coming in contact with it, until thoroughly saturated. The pottery now made in Staffordshire has, however, a small portion of vitrifying matter introduced into it. Stoneware, properly speaking, is a thoroughly vitrified composition, not requiring any glaze to prevent absorption;

and, though not transparent, shows its vitreous composition when viewed at a thin fracture. Porcelain is a term applied generally to that class of pottery which is transparent, beautifully white and glassy, like china. Its biscuit state may be seen in the figures, busts, and statuettes, with a waxy appearance resembling Parian, which are made at Belleek. This china is a real porcelain, resulting from the simple vitrification of felspar and china clay, in contradistinction to the phosphate of lime or "bone body" used in England. The abundance of pure felspar at Belleek is a leading element in rendering the manufacture there so cheap. The various materials used were then exhibited, and the various processes, from the mixing of the "slip material," to the very finest style of decorating the baked and perfected product, were then described. It was stated that some of the Belleek ware contained as much as 72 per cent. of the local felspar. Recently, in one important class of goods, including white and coloured tiles, and insulators, for telegraphic purposes, machinery has taken the place of manual labour. A large trade has been developed for these products, and in the domestic and fancy departments of dinner, ornamental ware, and figures. Her Majesty the Queen has patronised, to a very large extent, this new branch of Irish industry. The demand for Belleek ware is rapidly increasing, and an inspection of the specimens exhibited amply supported the opinion that, in delicacy of texture or beauty of design, this ware need fear no competitor.

The importance of the ceramic art, as at present existing in Great Britain and Ireland, may be inferred from the following facts :—The exports are equal to one million and a-half pounds sterling ; home consumption absorbs one million's worth more. For this total of two and a-half millions, 800,000 tons of coal are annually consumed, 350,000 tons of clay, flint, spar, bone, and stone are used. The gilding consumes £60,000 worth of gold ; and 80,000 men, women, and children find employment in this manufacture.

On Wednesday evening, 9th February, the Rev. EDMUND M'CLURE read a paper on "Smell and Smells," of which the following is an abstract :—

“The external world is known to us only through our senses. All that we perceive of that world, all that has an existence in it for beings constituted such as we are, comes through these avenues to the mind. The various influences affecting us from without are modified by, and take part of their character from these senses. Although we are accustomed to look upon our perceptions as the exact counterparts of external objects, this is not really the case. The external representative of colour, for instance, is nothing but undulations of the ether which pervades all space. The sounds we hear have nothing corresponding to them without us, but vibratory movements of the atmosphere ; and the smells we perceive are represented really in the outer world by unspeakably minute particles of certain bodies floating in the air. It is by the correction which one sense makes upon the verdicts of another, and by the exercise of our rational faculties on the facts brought into the mind through these organs, that we have freed our primary impressions of the outer world from much that is erroneous and misleading. Hence, the importance of special study of the sense, both taken individually and in their mutual relations. Look at the results which have attended the investigations of the eye and the light which appeals to it ; of the ear, and the sounds which are addressed to it. It is not too much to expect that the scientific study of smell and its proper objects will lead us still further into the secret recesses of nature, and furnish us with a more intimate knowledge of the qualities of bodies than we now possess. This study has another utilitarian aspect. The nose is the sentinel which watches for the approach, and gives warning of inimical gases in the air, tending to enter the lungs—the citadel of life. This sense also, like the eye and ear, is the avenue for æsthetic impressions. There is ample field in the domain of pleasant odours for receiving sensations of the beautiful, enough to create a new world of feeling within us. These were some of the reasons which induced me to make this subject a matter of study. You have the results of that study in the main in this paper. The organ of smell, proper, in mammals, is situated in the superior portion of the nasal cavities. It is a vascular spongy membrane, with brownish-coloured cylindrical

cells ; and it is provided with numerous mucous-secreting glands. Nerve filaments from the terminating bulb of the olfactories are distributed through it. The other parts of the interior of the nose are covered with a mucous membrane also, but the nerves supplied to these parts are only the nerves of general sensibility—*i.e.*, they are only sensitive to irritants, and not to odours. In birds and reptiles the structure of this organ is similar. In fishes there is no posterior opening, the organ being situated in a species of *cul de sac*. In the invertebrates, as far down as the mollusca, a sense of smell has been detected. It is sometimes very acute, as in bees, moths, ants, &c. The precise locality of the organ has created considerable discussion. In the articulata, a German naturalist has recently shown this sense to be situated on certain parts of the antennæ. Among mammals, the carnivora seem endowed with the most acute sense of smell. It is confined here, however, chiefly to animal emanations. An exception to this we find in the cat, which goes wild with delight over valerian, or cat-mint. Man, if not so acute in his scent, is sensitive to a far greater range of odours than the lower animals. The conditions of smell in the higher animals are:—1. Healthy condition of the olfactory filaments. 2. The mucous secreted must have its normal constituents. When this is altered in quality, as in a cold in the head, the sense of smell is either lost, or is morbid. There have been various theories about the nature of odours. Some have made their action dynamical or electrical, affecting the nose through the air as a sounding body, or as a source of light through the ether. It is now generally admitted that odours are minute particles of volatile bodies floating in the air ; that they are borne by inspiration to the olfactory region, where they are held, and brought into contact with the nerves, by means of the mucous secreted there. In order that a body should be odorous, it must be volatile. Chemical instability, or a tendency to change, particularly by combining with oxygen, is another condition. Hence, all imperfectly oxydized bodies, such as the various essential oils, are odorous. When they are oxydized they become either resins or acids, and are then comparatively inodorous. It is curious to note that hydrogen, the

lightest and most diffusible of all elements in nature, when in combination with all other elements, except oxygen, produces the most powerfully odorous bodies with which we are familiar. Modifying influences in the production of smell are heat and cold, light, electricity, relative dryness and humidity of the atmosphere, friction, striking, &c. The absorption and radiation of odours seem to be regulated in the same way as in the case of light. Black absorbs most, or rather radiates least. White radiates most. Hence clergymen and doctors accustomed to visit infected houses should not wear black. There seems to be some relation between the colours of flowers and their odours. Blue is rarely combined with scent. White flowers are generally fragrant. Orange, brown, and lurid ones are generally disagreeable—probably from presence of sulphur.

The laws of intensity, diffusibility, and permanence have not been determined. Speaking about permanence, there is a wonderful instance of this on record. Some fossil Teredos or borers were found in some fossil drift wood in an excavation near Brussels, not long ago. These little animals belonged to that geological epoch which is called the Tertiary period. When fractured they emitted a strong smell of seaweed; thus preserving the odour of the Tertiary sea during the lapse of countless ages. The attempted classification of odours has hitherto proved futile. Even chemistry seems here at fault, as many odorous bodies are found in the laboratory to be identical, which the more acute analysis of the olfactory nerve resolves into different substances. Instances of this are the oils of turpentine, bergamotte, lemon, cloves, parsley, &c. They all consist of equal parts of carbon and hydrogen. The strongest smelling bodies consist of these hydro-carbons, as they are called, either combined with oxygen, nitrogen, sulphur, arsenic, or phosphorus. For instance, a hydro-carbon called amyl, which is found in brandy distilled from potatoes, when it is combined with oxygen, furnishes potato ether. This, combined with spirits of wine, acquires the peculiarly pleasant odour and flavour of Jargonelle pears. This is used by confectioners to flavour their drops, &c. The same ether, when combined with a nasty smelling sub-

stance called valerianic acid, forms what is known as apple oil. Wine ether and butyric acid make pine apple-oil. And, by combining certain hydro-carbons first with oxygen, and then with some of the animal or vegetable acids, we get a series of fruit odours and flavours embracing the most delicate in nature. Take, again, some of these very hydro-carbons, and combine them with ammonia, and we get disgusting smells. One of these combinations, which was made in the chemist's laboratory, has been found to be the principle which gives the smell to a very strong smelling plant—the stinking goosefoot—and also to stale salt fish. When this goosefoot is distilled along with a solution of soda it yields this substance, smelling like a mixture of stale stock-fish, boiled crabs, herring brine, and unsound Findon haddy. Another substance, identical in composition with this, has been found in the common hawthorn and in the pear tree. It is curious to find the same principle in the live and growing plant and in the dead and decaying fish. Combine these hydro-carbons again with sulphur, and we get the most intolerable of smells. If sulphur is substituted for the oxygen in the first essences, the smell becomes absolutely unbearable. But even these can be excelled. When arsenic is substituted for sulphur in some of these combinations, we get a substance called kakodyle—a most intolerable and deadly odour. Even this latter has been excelled both in its intensity and in its death-dealing powers. Many such substances were offered to the war department during the Russian war. There is one thing noteworthy about some of these sulphur combinations. There is one of the hydro-carbons which, when combined with sulphur, gives the odour of garlic. Now, this substance has been found in all the plants having this smell—in the onion, leek, in assafoetida, in garlic, and in many other plants belonging to different natural orders. This bad odour notwithstanding, these substances have been used both in ancient and modern times all over the world as ingredients of the most savoury dishes. The same instinct which drove men living in regions widely separated to use tea, and coffee, and maté as a beverage—all containing the same chemical ingredient—seems to have forced men to use these garlic-smelling plants. It is pro-

bable that they are necessary for our well-being. Bad smells are generally, however, indications that their sources should be avoided. And hence the means of decomposing and destroying the bad smells which are produced in crowded cities is a useful subject of knowledge. Charcoal, chloride of lime, sulphurous acid, carbolic acid, &c., are some of the most important of these deodorizers. Much ill-health is the consequence of bad gases existing in the air of our large towns. Every atom of decomposing vegetable and animal matter, every sewer is the generator of these poisons. The source should be destroyed. Let our corporations hold out inducements to our scientific men to pay attention to these things, and the day will not be far distant when our cities will be provided with their great laboratories to utilize their sewage and refuse, and build up new and useful fabrics from the dead, the decaying, and the deadly.

On Wednesday evening, 23rd February, a lecture was delivered by Dr. ANDREWS, F.R.S., giving an account of his researches on the "Continuity of the Liquid and Gaseous states of Matter." In the introductory remarks he referred briefly to the views of the ancients regarding the constitution of matter, more particularly of the Epicurean school, as expounded by Lucretius; to the discovery of the weight of the atmosphere by Galileo; to the doctrine of latent heat, as expounded by Black; and to Dalton's able investigation of the properties of vapours. The lecturer then described, in detail, the fine experiments by which Faraday succeeded in reducing to the liquid state a large number of bodies, previously known only in the form of gases. The first experiments of the lecturer were published in 1861, and the apparatus employed was exhibited to the meeting, and applied to the condensation of carbonic acid gas. This apparatus was constructed by W. J. Cumine, to whose good ability and rare mechanical skill Dr. Andrews referred in the highest terms.

Two years later the remarkable observation was made, that when carbonic acid is partially liquefied by pressure, and the tem-

perature gradually raised to about 88° Fahr., the surface of the demarcation between the liquid and the gas becomes fainter, loses its curvature, and at last disappears. The space is then occupied by a homogeneous fluid, which exhibits, when the pressure is either suddenly diminished or the temperature slightly lowered, a peculiar appearance of moving or flickering striæ throughout its entire mass.

At temperatures above 88° no liquefaction of carbonic acid or separation into two distinct forms of matter can be affected, even when a pressure of 250 to 300 atmospheres is applied.

Dr. Andrews then proceeded to describe his recent investigations, which form the subject of the Bakerian Lecture of 1869, and will be published in the *Philosophical Transactions of the Royal Society of London*. After stating the experimental results, he proceeded:—
“We are now prepared for the consideration of the following important question—what is the condition of carbonic acid when it passes at temperatures above 88° from the gaseous state down to the volume of the liquid, without giving evidence at any part of the process of liquefaction having occurred?”

“Does it continue in the gaseous state, or does it liquify? or have we to deal with a new condition of matter?”

“The answer to this question, according to the results of the experiments, is to be found in the close and intimate relations which subsist between the gaseous and liquid states of matter. The ordinary gaseous and ordinary liquid states are, in short, only widely separated forms of the same condition of matter, and may be made to pass into one another by a series of gradations so gentle that the passage presents nowhere any interruption or breach of continuity.

“From carbonic acid as a perfect gas to carbonic acid as a perfect liquid, the transition may be accomplished by a continuous process, and the gas and liquid are only distant stages of a long series of continuous physical changes. These properties are not peculiar to carbonic acid, but are true of all bodies which can be obtained as gases and liquids. Nitrous oxide, hydrochloric acid, ammonia, sulphuric ether, and sulphuret of carbon, all exhibit critical points of temperature, beyond which pressure alone is in-

capable of producing two distinct physical conditions of matter in presence of one another."

In conclusion, Dr. Andrews referred to the discovery made many years ago by Dr. Jas. Thomson, of the influence of pressure on the temperature at which liquefaction occurs; and stated that, in his opinion, this discovery pointed to the direction which future investigations must take, with the view of resolving the difficult problem of the possible continuity of the liquid and solid states of matter.

On Wednesday Evening, 9th March, a paper, by R. TATE, A.L.S., F.G.S., and J. S. HOLDEN, M.D., F.G.S., on the "Iron Ores associated with the Basalt of the North-East of Ireland," was read by Dr. Holden, Glenarm. The authors stated that, since 1790, an iron band had been known in the midst of the basalt of the Giant's Causeway; but further discoveries during the past few years had brought to view numerous exposures, which were considered to represent portions of one sheet of iron ore, extending uniformly throughout the basalt, and over a very large area. Everywhere the iron band and associated rocks present identical features, from which the following generalised section may be deduced:—The underlying basalt gradually passes upwards into a variegated lithomarge about thirty feet thick, graduating insensibly into a yellow or red ochre or bole, of five or six feet thickness, which passes into a dense red ochreous bed of about two feet, charged with spheroids of magnetic iron. The spheroids are of the average size of peas; they increase in number and size towards the upper part of band, and not unfrequently constitute that portion of it. The line of junction between the iron band and the overlying, and usually more or less columnar basalt, is in all cases well defined, and sometimes exhibits decided unconformability. Several theories were discussed to account for the origin of the present condition of these ores, but from field observation, and chemical analysis, the authors had been led to consider them as elaborated out of the basalt by metamorphic action. The

decomposition of felspathic basalts by the combined action of water and acidulated gases, dissolving out certain minerals, resulted in the formation of bole and lithomarge. The bole underlying the pisolitic iron band was once a wet terrestrial surface, on which a subsequent volcanic outflow of basalt, by its heat, pressure, and evolved gases, effected a reduction of the oxides of iron into the more concentrated and aggregated form of pisolite. The ferruginous series with interstratified plant beds at Ballypallady were described, and shown to be quite distinct from the preceding, being of sedimentary origin, and marking the site of an ancient lake, probably of the Miocene age. To the same interval of volcanic rest may be referred the various lignite bands, which are known here and there beneath the upper basalt. The mining of these iron ores has developed a new branch of industry in the North-East of Ireland, and one of growing importance—the abundance of alumina present rendering them of peculiar advantage for admixture with the hæmatitic ores of England. Dr. Holden elucidated the subject with photographs, diagrams, and a series of ore specimens; the latter he presented to the Geological Department of the Museum.

At the conclusion of the paper an animated discussion ensued, in which Messrs. Nelson Boyd, F.G.S., William Gray, Silas Evans, S. A. Stewart, W. H. Patterson, G. T. Glover, and Prof. James Thomson took part.

On Wednesday evening, 23rd March, Mr. WILLIAM GRAY reported on the occurrence of the Middle Lias near Ballycastle, County Antrim, and stated that, in conjunction with Dr. O'Connor, he found blocks of very fossiliferous micaceous sandstone, in the superficial drift in the neighbourhood of that town. He had not discovered the beds *in situ*, but considered such a discovery probable. Portions of the blocks had been sent to London for identification, and Mr. R. Tate, F.G.S., ascertained beyond doubt that they belonged to the Middle Lias, hitherto unknown in Ireland, and appertained to the lower division of it. The specimens submitted have enabled Mr. Tate to extend his list of Irish Liassic

fossils by several species. The following species have been determined from these blocks :—*Hybodus reticulatus*, Ag.? *Ammonites margaritatus*, Montf.; *A. Henleyi*, Sow. (on authority of Mr. R. Etheridge); *Belemnites umbilicatus*, Bl.; *Pitonillus turbinatus*, Moore; *Pecten liasinus*, Nyst.; *Pecten acutiradiatus*, Schloth.; *Plicatula spinosa*, Sow.; *Cypricardia cucullata*, Goldf.; *Isocardia cingulata*, Goldf.; *Limea acuticosta*, Goldf.; *Avicula novemcostæ*, Brown; *Rhynchonella acuta*, Sow.; *Rhynchonella variabilis*, Schloth.; *Waldheimia numismalis*; *Pentacrinus*, sp.

With the exception of *Plicatula spinosa*, *Avicula novemcostæ*, and *Rhynchonella variabilis*, which occur both in the Middle and Lower Lias, the majority of these species indicate a horizon below the Marlstone, and above the highest beds of the Lower Lias. The occurrence thus reported excited considerable discussion amongst geologists, some believing that, from the similar lithological character and resemblance in fossil contents to the Pabba Shales, there was a probability of the blocks found near Ballycastle having been transported from Scotland, while Mr. Gray is of opinion that they are not portions of the Scotch beds, but of a contemporaneous one, which will yet be found in the neighbourhood of Ballycastle.

On the same evening Mr. THOMAS WORKMAN read a paper entitled "A month on the Prairies," being an account of a short trip taken in the winter of 1869-70 through that region of the Mississippi, still left in its natural state. The reader, after referring to the gyrations of the Kansas Pacific Railway, and to the lawlessness that prevails on the outskirts of civilization, where Lynch law is carried out by what are called vigilants, and a man's own prowess is the only safeguard, proceeded to describe his journey across the prairies. On the 26th December, he left the railroad at Hayes City, a village sprung up within the last year, and with a guide set out on horseback for Fort Dodge, situated on the Arkansas River, 95 miles to the southward. The journey occupied three days. The first night was passed in sleeplessness on the hard earthen floor of a shanty, and the second stretched alongside the camp

fire on the frozen ground underneath the glittering canopy of heaven. On the way numerous herds of bison (*Bos Americanus*), there called buffaloes, were seen, and on arriving at Fort Dodge he was enabled, through the kindness of the United States officers, to join a hunting party in pursuit of them. After an arduous and exciting chase the party returned with five of the huge animals as their spoil. One of the hunters had an exceedingly narrow escape from a huge bull, which, suddenly turning upon him, threw his horse, and if the rider had not shot the bull dead at the same moment, would probably have been killed by him. From Fort Dodge Mr. Workman proceeded 85 miles further to the southward, to Camp Supply, a military post in Indian territory, situated on the North Fork of Canadian River. At this post were numerous bands of Arapahao and Cheyenne Indians, whom he was able to meet in peace and safety, though they have been almost continually at war with the whites. As the Kioways, another Indian tribe, had committed depredations on some government cattle, he was there prevailed upon to join, as spectator, an expedition against them. These Indians, finding themselves pursued by a much stronger force than they could cope with, came to terms of peace. The reader had an opportunity of seeing them in all their savage magnificence of war plume and paint, at the moment when it was uncertain whether peace or war would be the result.

On his return journey to Hayes City, Mr. Workman had an opportunity of seeing one of those gigantic fires that devastate the vast wastes of the American deserts. For miles the flame stretched along the plain, and when night set in the magnificence of the spectacle was indescribable. In the glare and darkness the traveller and three others lost their way, and after an anxious night of hardship and danger arrived at Fort Dodge, and from thence proceeded to Hayes City without further incident.

On Wednesday evening, 6th April, a paper was read on "Illustrations of the Diffusion of Liquids," by Professor JAMES THOMSON, LL.D.

Professor Thomson referred to the experiments of Graham, late Master of the Mint, and others, in which the phenomena of diffusion of liquids and of gases had been extensively investigated. The subject was one of great importance, not only on account of its intimate bearing on some of the most profound questions of physical research, and especially on questions as to the atomic constitution of matter, but also on account of its practical applications in affording the new and valuable methods for chemical analysis brought forward by Graham, and known as the processes of diffusion and dialysis. If two fluids capable of mingling with one another be placed in contact, a process of diffusion of each into the other will take place, even when the contact is made under conditions such as perfectly to avoid the production of circulating currents. To prevent currents, the chief thing to be done is to place the lighter fluid on the top of the heavier one. Thus, if water be placed in the lower half of a vessel, and alcohol, which is a lighter fluid, be placed gently, without commotion, on the top of it, so as to occupy the upper half of the vessel, the two fluids will diffuse into each other; or, if sulphuric acid—that is, oil of vitriol—be put into the bottom of a vessel, and water, which is much lighter, be put on the top of it, diffusion will ensue. The same would happen if syrup of sugar was put at the bottom, and water was placed above it, or if any kind of salt dissolved in water was put below and water above. Diffusion takes place also between two gases. If the heavier one be placed below, and the lighter one above, the difference of density will tend to make each remain where it has been placed; but still the two will diffuse into each other till they are perfectly commingled. The diffusion of gases into one another proceeds very quickly, but that of liquids very slowly. Substances of a gelatinous character, of which glue is an example, and to which Graham has given the name colloids, will diffuse only with extreme slowness through one another, while salts and various other crystallizable substances, called by Graham crystalloids, will diffuse quickly through them, but at various rates. This fact forms the basis of the process of dialysis, which consists in allowing diffusion of mixed substances to occur through a gelatinous or colloid

partition. The parchment paper which is manufactured by immersing unsized paper in sulphuric acid, and then washing out the acid, is a good material of which to form this partition. During the diffusion of mixed solutions through this parchment paper some substances pass much more quickly than others, and so their separation can be effected. Very remarkable relations have been discovered to exist between the laws of the diffusion of fluids into one another, and the laws of the diffusion of heat through solids. In fact, when quantities or degrees of temperature communicated by conduction of heat, are duly compared with quantities of one diffusible substance, transferred by diffusion into another, the law of diffusion in liquids is found to be identical with that of thermal conductivity. This discovery was first published by Fick. Professor Thomson showed to the Society a mode which, during some years past, had been practised by his brother, Sir William Thomson, for illustrating diffusion, and exhibiting its great slowness in liquids, when circulating currents are avoided. Some glass tubes of about a quarter of an inch or half an inch bore, and from two to four feet in length, are hermetically sealed at one end. Into each two liquids are introduced, the heavier one being poured in first, and the lighter one being poured in so as to rest upon the top of it. The upper end is then hermetically sealed. The liquids may be sulphuric acid below, with water above; or water below, with alcohol above; or a solution of sulphate of copper below, with water above; and various others may be taken. The tubes so prepared are kept in an upright position, and diffusion proceeds. At first, the region of gradual transition from the one fluid to the other occupies a very short space in the length of the tube, but, as time goes on, the region of transition spreads itself. Even after years have elapsed, however, during which diffusion has been constantly going on, the liquid at top and the liquid at bottom are found to be still remaining distinct from one another. With the sulphuric acid and water tube this may be made very evident after the lapse of a year or two by inverting the tube several times so as to thoroughly mingle its contents, when it will be found to become very hot through the

mixing of the sulphuric acid with the water, and at the same time the entire liquid contents of the tube will be found to shrink very much in bulk. In like manner a tube in which water has been introduced below, and alcohol above, shows a considerable shrinkage of bulk of its total liquid contents on the mingling of the liquids by inversion, even after they have stood in contact for a year or more, and so it is rendered manifest that the year's time has not sufficed to complete the mixing of the liquids by the process of diffusion.

On the same evening a paper was read by Dr. HENRY BURDEN, on "The Aquarium." Dr. Burden commenced by remarking that the season was approaching when not a few of the inhabitants of our town, tempted by genial sunshine and refreshing showers, would seek for a period the charms of a seaside residence, and that, consequently, the present occasion was an appropriate one for the discussion of the subject he had selected. He deplored the indifference shown by the general public for Natural History pursuits, observing that even many who were conversant with the deductions of biology were comparatively ignorant of the inductive substratum upon which that science is based, and earnestly recommended to all such persons the study of those forms of life which abound on nearly every coast. He was convinced that, if examples of a dozen of the principal types of marine organization, at different stages of growth, were carefully examined with reference to development, structure, and function, many of the current doctrines of biology would assume quite a novel aspect to the inquirer. The lecturer here read a list of twelve marine animals, exemplifying as many great groups, which, he stated, were easily procured and of moderate size, would thrive well in confinement, and whose life histories might be readily traced. There was nothing in the task proposed so intrinsically difficult that any well educated person might not confidently undertake it with every prospect of success. The investigation might also be pursued with comfort at all seasons, now that we were enabled by means of a simple contrivance—namely, the aquarium—to keep aquatic animals alive and

under observation for as long a period as was requisite beside our study table. He had no doubt but that an infinitely greater amount of really useful information would be obtained by the method of study indicated, than by the perusal of dozens of the text-books on natural history in ordinary use. The author of the paper then entered into a detailed description of the aquarium, dwelling chiefly upon its value in an educational point of view, the principles involved in its construction, and its proper management. He strongly advised those preserving marine animals alive for the purpose of scientific observation, not to feed them. In proof of the length of time during which they might be kept alive, and apparently in the enjoyment of excellent health, without an artificial supply of food, he exhibited some living specimens which he had brought with him from the seaside early in September last ; also, the shells and crusts of many others which had lived in his possession from periods of from six weeks to seven months. He concluded as follows:—"I cannot refrain from expressing a hope that The Natural History Society may be induced to establish an aquarium within the walls of this building. I am persuaded that such a step would not only tend to popularise the study of natural history in this locality, but would also enhance in no small degree the other attractions of our museum. The expense attending the undertaking must be small, and when we remember that the experiment has already been successfully tried in other towns, both in our own country and on the Continent, we may, I think, fairly anticipate a similar result here. (The lecturer here spoke of the enthusiasm with which the inhabitants of Brighton were promoting the construction of an aquarium in that town.) I trust, further, that the day is not far distant when many other of our public institutions will possess this instructive source of amusement. While in London last autumn I visited St. Bartholomew's Hospital, and was much pleased in finding in one of its wards a fresh water aquarium, which bore evident signs of being carefully attended to. Its presence there, I have no doubt, distracted, in some measure, the thoughts of the poor patients from the continual contemplation of their own sufferings—a most desirable object to attain."

The paper was followed by remarks from the Rev. Dr. MacIlwaine, Mr. Stewart, Mr. William Gray, Mr. Swanston, Mr. William Patterson, and the chairman, who cordially agreed with Dr. Burden as to the desirability of establishing an aquarium in this town. Mr. Stewart, however, thought that the Museum was not the best place for it, and suggested that the Town Council might, with advantage, place one in the proposed public park. The Rev. Dr. MacIlwaine thought that the Botanic Gardens would be a suitable place for a fresh water aquarium. Dr. Burden was enabled to illustrate many parts of his paper by reference to a tastefully-arranged and well-stocked aquarium, which had been kindly lent for the occasion by one of the ladies of the Club.

On Wednesday evening, 27th April, a lecture was delivered by Dr. WYVILLE THOMSON, F.R.S., on "Animal Life at Great Depths in the Sea." The lecturer began by referring to the expeditions undertaken under the auspices of the Royal Society, first in H.M.S. Lightning, in the year 1865, and during the past year in H.M.S. Porcupine, which was placed at the disposal of Dr. Carpenter and himself to examine the sea-bottom to the North of Scotland. During the latter expedition they examined the sea extending from the outside of the Bay of Biscay, all along the West of Ireland, and West of Scotland to the North of Rockall; and then round rather to the Eastward, to the Faroe Islands. They found that the circumstances and condition of life, temperature, depth, &c., in different parts of the region examined, varied very greatly. The greatest depth at which they dredged during the cruise was off the Bay of Biscay, about 25 miles West of Ushant. In the neighbourhood of Rockall, and various places off the West of Scotland, the depth was from 1,000 to 1,400 fathoms; and in the region between the Faroe Islands and the North of Scotland only 400 to 600 fathoms. Dr. Thomson stated that the belief held by scientific men was that animal life became scarce at great depths, and that it disappeared altogether at a depth of about 300 fathoms. On surveying expeditions, in various parts of the world, star-fish, crustaceæ, &c., had

been brought up on sounding lines, from the enormous depths of 1,000, 1,200, and 1,500 fathoms; but these were looked upon with great doubt, as they might become attached to the line on its passage up. One of the objects of the expedition was to ascertain whether animal life did really exist at great depths. At a depth of 2,500 fathoms they had found a great number of animals, belonging to various classes, and from the examination they had made, came to the conclusion that no class of marine animals was excluded, so that the ocean's bed at that depth was not a barren wilderness, as supposed formerly.

The general condition of the sea bottom was peculiar. In the greater depths there were no pebbles, gravel, or sand, nothing but a fine smooth unctuous mud, which seemed to extend everywhere over the warmer portion of the Atlantic. The surface of the deposit had a creamy look, and consisted of shells of globigerinæ, &c.—underneath the surface was found a smooth unctuous matter, made uniform in consistency by pressure, and consisting of the remains of these animals. Thus a bed of limestone was in process of formation. A piece of chalk microscopically examined presented identically the same appearance as this deposit. Dr. Thomson referred particularly to the differences of temperature existing at various depths, and in different portions of the area under examination, and illustrated this portion of his lecture by diagrams. Reference was also made to the question as to what depth light penetrated; the lecturer remarking that during the expedition of the past year, means were not available for conducting the necessary experiments, but that parties were engaged at present in the manufacture of an instrument, which seemed likely to prove suitable for the required purpose.

He also described minutely the various apparatus used for dredging, sounding, ascertaining the temperature, and for obtaining specimens of the water at various depths for analyses. At the conclusion of the lecture Dr. Thomson exhibited and described a large series of the specimens obtained by dredging—molluscs, echinoderms, corals, crustaceæ, sponges, &c.—several of the species being new to science. In several of the specimens he pointed out

the existence of peculiar modifications to render the animals more suitable to the conditions in which they were placed.

THE Annual Meeting was held on Wednesday evening, 13th April. Prof. Jas. Thomson, LL.D., occupied the chair. The Secretaries' Report was read by Mr. William Gray, and the Treasurer's by Mr. Greer Malcomson. These reports were adopted, and the Office-bearers for the ensuing year elected, after which a lengthened conversation took place with reference to the most appropriate places for the Excursions of the coming session, and the names of a number of places were suggested to the Committee for their consideration. Mr. R. Young stated his intention of offering a prize for the best original measured drawing and details of some ruined building in the Province of Ulster, of not later date than the fifteenth century. And Prof. Jas. Thomson of one for the best essay and oral answering upon the optics of the microscope. The subject of the establishment of an aquarium in Belfast was then brought forward, and the following resolution proposed and carried by the meeting:—"That, in the opinion of this meeting, in order to further the study of natural history, it would be desirable to establish an aquarium in connection with some public institution in Belfast suitable for its reception, and that we promise to assist in its establishment as far as is in our power."

The election of several new members terminated the business of the meeting.





ANNUAL CONVERSAZIONE.

THE ANNUAL CONVERSAZIONE was held on WEDNESDAY, 4th MAY.

(The following is Extracted from the Local Papers.)

The Seventh Annual Conversazione in connexion with the Belfast Naturalists' Field Club took place in the Museum. The attendance was large and fashionable, and the very complete arrangements in connexion with the re-union presented no new feature from those of previous years. As usual, the decorations were of a chaste and attractive character. The hall and staircases were clothed with evergreens and banners; while the large apartment in which the exhibition proper takes place was ornamented in a very beautiful manner with evergreens, shields, banners, heraldic devices, &c. The refreshment-room was also neatly trimmed. To the sub-committee the credit of the decorations is due. A leading object of interest at the Conversazione this year was the two collections which, in competition amongst the Members, had been awarded prizes. The successful competitors this year were Miss Lester (of Belfast), who showed a fine case of *Lepidoptera*, and Mr. S. A. Stewart, who exhibited an excellent collection of *Mosses*. Foremost in importance amongst the other exhibitions were the deep-sea dredgings shown by Dr. Wyville Thomson. They are a portion of the results of the Porcupine exhibition of last year, and embrace a number of star-fish and sponges from the depth of 1,000 to 2,500 fathoms.

There were also on the tables portions of the ropes which had been used in the deepest soundings. They were all a good deal frayed and worn from having been only three times sent down to the depth of three miles. There was also a bottle full of mud from the bottom of the Atlantic, outside the Bay of Biscay. The mud was composed entirely of the shells of minute animals. During the evening Dr. Thomson very kindly afforded full information regarding the dredgings to those in attendance. There were also some local dredgings exhibited. These were procured yesterday by a sub-committee of the Club, who went out for the purpose of procuring living forms outside the Belfast Lough. The success of their voyage was manifest in the well-stocked tanks, which created a considerable amount of interest. Mrs. James Thomson also exhibited a well-stocked fresh water aquarium. The archæological department was this year very largely represented. Dr. Holden (of Glenarm) exhibited a very interesting collection—prominent amongst which was a model of the Giant's Grave near Glenarm, which was explored by the Earl of Antrim and the exhibitor. In this lot there were also some very fine specimens of worked flints—lance-heads, saws, &c. A number of photographic views of the scenery around Glenarm were also shown by Dr. Holden—Dr. Berry and Messrs. W. H. Patterson, J. H. Staples, David Wilson, Ballymoney; Rev. James O'Laverty, P.P., Holywood; and Mr. William Gray, one of the Honorary Secretaries of the Club, all exhibited extensive assortments of Irish antiquities. Those belonging to Mr. Wilson and the Rev. Mr. O'Laverty contained many unique forms. Messrs. Patterson, Staples, and Gray had a great variety of forms of flint implements, found in this neighbourhood, and which correspond with the forms at present creating so much interest in England and on the Continent. Dr. Henry Burden, Rev. Dr. MacIlwaine, Mr. James Wright, Mr. William Gray, Mr. Joseph Wright, and Mr. Tomlin exhibited microscopes, and these were all largely patronised. Mr. John H. Davies, Glenmore Cottage, near Lisburn, exhibited a large collection of ancient Peruvian pottery and copper instruments, which he received a few weeks since from a relation—Mr.

William Oddie, Tinjillo, Peru. The specimens of pottery were all of the most curious construction. A remarkable feature of the vessels—which were somewhat after the fashion of jugs—was that both ends of the handles formed passages into the interior, the spout springing from the middle of one handle. There were some of very peculiar construction. They resembled double bottles, connected by a tubular passage, and while the fluid was being poured into one bottle, the compression of air caused the other bottle to whistle loudly. Mr. Davies also exhibited some rude Peruvian jewellery and a piece of intricate wood carving. We may state that the pottery—which all bore rude artistic designs—must have been manufactured prior to the conquest of Peru by the Spaniards in the sixteenth century. A large collection of early printed books, with the dates and style of the different periods particularised, were shown by Mr. Robert Young, C.E. They began with 1474, and contained curious and characteristic woodcuts, some of which, by Holbein, are exceedingly rare. Several of the volumes were also embellished with engravings by Wisgraff, who was anterior to Albert Durer. On the walls were a large collection of water-colour drawings by Mr. Young. There were sixty or seventy of them, the majority of which were sketches of old castles and ecclesiastical buildings in Argyleshire, Ayrshire, and Perthshire; but there were in addition, a few local subjects. Many of the Scottish edifices bore interesting traces of their connection with the Culdee establishments, which emanated from Ireland. All these drawings were remarkably accurate, and very neatly tinted. Dr. James Moore, always anxious to lend a helping hand, contributed five of his drawings—studies from nature—all of which were remarkable for their honest truthfulness and superior taste. A study of the mountain top (Mourne mountains), with all the wildness of nature, was beautifully done, but, perhaps, the picture of the Doctor's, which attracted most attention, was that of the interior of the old jail of Carrickfergus. It is entitled "The Age of Innocence," and represents two children playing with manacles. The subject is powerfully and forcibly dealt with, and the picture looks as though it were oil. "The Sea Beach at New-

castle," also a study on the spot, and "The Earl's Bridge," another large open-air study, were both remarkably fine. There was, in addition, what might be termed a geological study from Newcastle, which was very appropriate at such a meeting. Mr. Thomas Workman exhibited a collection of curiosities which he made during a tour in Iowa last summer; and Mr. F. Frankfort Moore showed some silver leaves and other articles from South Africa, also a photograph of the Kaffir Chief, presented to himself by the original. Tea was served up by the purveyor of the Club, Mr. Wm. J. Walker, Dublin Road. The evening altogether was of a pleasant character, and for the complete character of the arrangements the honorary secretaries, Messrs. Wm. Gray and Hugh Robinson, deserve every thanks. The sub-committee received valuable assistance from the curator of the Museum, Mr. Darragh, in the decoration of the rooms. The flowers and plants on the tables and elsewhere were contributed by Mr. Threlkeld; but to the Botanic Gardens the members were also indebted for some of the floral decorations. At the conclusion of the meeting, some new members were elected.



BELFAST NATURALISTS' FIELD CLUB.

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EIGHTH YEAR—1870-71.  
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LIST OF OFFICERS AND MEMBERS.

President.

PROFESSOR JAMES THOMSON, LL.D., C.E.

Vice-President.

JOHN ANDERSON, F.G.S.

Treasurer.

GREER MALCOMSON.

Secretaries.

WILLIAM GRAY. HUGH ROBINSON.

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WM. H. PATTERSON.

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JOSEPH WRIGHT.

JAMES H. STAPLES.

WILLIAM H. PHILLIPS.

WM. SWANSTON.

JAMES WRIGHT.

ROBERT YOUNG, C.E.

Members.

William Aicken, M.D., Murray's terrace.

John Aicken, Dover street.

William Alderdice, Abercorn st.

W. J. C. Allen, J.P., Faunoran, Greenisland.

Edward Allworthy, Mount-view.

John Anderson, F.G.S., Hillbrook, Holywood.

Robert Anderson, Ormeau road.

Mrs. Andrews, Chlorine place.

Edgar Arnold, Brunswick street.

E. N. Banks, C.E., Botanic avenue.

James M. Barkley, Jackson hall.

William Batt, Ormeau road.

J. G. Bell, Tullylish, Gilford.

R. B. Benson, Islandreagh, Dunadry

J. M'D. Bermingham, A.R.I.A.I., Mount Charles.

Dr. West Berry, Antrim road.

W. J. Boucher, Landscape terrace.

W. H. Braddell, St. Ives, Malone park.

Charles H. Brett, Richmond.

Graham Browne, College park.

James Bryce, M.A., LL.D., F.G.S., F.R.G.S.I., Bowe's hill, Blantyre. (Hon. Mem.)

H. Burden, M.D., Alfred street.

John Campbell, Mossley, Carnmoney.

William Campbell, Richmond.

Miss Carruthers, Botanic road.

Hugh A. Chapman, College street South

John Charley, College park.

J. C. Clarke, Arthur street.

W. Clibborn, Windsor terrace.

Sir Edward Coey, J.P., Merville.

Miss Connery, Victoria place.

W. Dawkins Cramp, Elmwood avenue.

Rev. H. N. Creeny, A.M., Killead.

Alexander Crawford, Fitzwilliam st.

Wm. Crawford, jun., Fitzroy avenue
D. Cunningham, Ulster Model Farm

W. C. Cunningham, Dante hall,
Whiteabbey.

Edward Dale, Fitzroy terrace.

John H. Davies, Glenmore, Lisburn.

Robert Day, F.S.A., Cork.

George Donaldson, Mount Collyer.

Wm. Doubleday, College sq. North

A. F. Dymond, Prospect hill, Lisburn.

Wm. Edgar, Lincoln avenue.

Miss Finlay, University square.

M. Fitzpatrick, Oberon, Ballynafeigh.

J. W. Forrester, Rose Cottage,
Balmoral.

Thomas Flynn, Joy street.

William Gilmore, jun., Cliftonville.

G. T. Glover, Kew Cottages,
Mountpottinger.

Rev. J. Grainger, A.M., Broughshane (Corresponding Member.)

William Gray, A.R.I.A.I., Mount Charles.

Rev. Robert Gray, Cullybackey.

Forster Green, Derryvolgie, Malone.

Henry Green, Derryvolgie, Malone.

Henry Greenhill, Wilmont terrace

Mrs. Greenhill, Wilmont terrace.

Miss Greer, Tarbat Villa, Sydenham

James Greer, Annadale.

Mrs. Greer, Annadale.

W. H. Greer, College square East.

William Gregg, Willowbank.

William Greig, Richmond.

Hugh Hamilton, Great Victoria st.

William Hancock, Carlisle street.

Dr. Hannay, Mount Charles.

Mann Harbinson, Newtownards.

Miss Rosetta Hart, Sydenham.

J. A. Hartley, Methodist College.

William Harvey, Kinnaird street.

James Haslett, Franklin place.

W. B. Haynes, Lincoln Villa,
Knock.

Miss A. S. Henderson, University
square.

W. D. Henderson, University sq.

James Henry, Albertville.

A. F. Herdman, J. P., Malone House

Stephen Hicklin, Ligoniel.

Professor Hodges, M.D., Windsor.

Miss Hodges, Windsor.

John Sinclair Holden, M.D., F.G.S.,
Glenarm.

George Horner, Falls road.

Phineas Howell, C.E., Northern
Counties Railway.

Thomas Hunter, Holywood.

Alexander Hunter, Northern Bank.

A. Jacob, College street South.

H. H. Jamieson, Casael dono,
Castlereagh.

W. H. Jamieson, Henryville, Lagan
village.

Miss Johnston, Dalriada, White-
abbey.

Miss Johnston, Glenavy.

James Johnston, Alma terrace.

Samuel Johnston, Antrim road.

Wesley Johnston, Cherrymount.

W. J. Johnston, Dunesk, Stran-
millis.

Richard S. Joyce, Mountpottinger.

Dr. Keown, R.N., Dundela, Strand-
town.

Wm. Kernahan, Great Patrick st.

Rev. J. A. Kerr, A.B., Whiteabbey.

Wm. King, Mount-pleasant, Stran-
millis.

Miss Kinkead, Lonsdale street.

H. Knight, Springfield terrace.

W. J. Knowles, Cullybackey.

Miss Lamb, Divis view.

W. W. Lamb, Divis view.

George Langtry, Mount Charles.

G. D. Leathem, Thornlea, Malone.

F. R. Lepper, Landscape, Green-
island.

Miss Lester, Lonsdale street.

Ferdinand Lochrane, Ulster Bank.

F. W. Lockwood, Old Lodge road.

John Love, Oldpark crescent.

William Lowry, Kinkora, Sydenham.

Henry Major, Lisburn.

Greer Malcolmson, Shamrock lodge.

James Malcolmson, Mountpottinger.

Mrs. Malcolmson, Mountpottinger.

John Marsh, Mount-pleasant, Monks-
town.

Joseph Marsh, Mount - pleasant,
Monkstown.

John Millar, Lisburn.

Miss Millar, Lisburn.

William Millar, Durham street.

Miss Millen, Lansdowne terrace.

Jas. Moore, M.D., M.R.I.A.,
H.R.H.A., Chichester street.

John Moore, M.D., Carlisle ter.

William Morris, Eton terrace.

Hugh Morrison, Ardoyne.

David Morrow, Clarence place.

James Mortimer, Holywood.

Rev. W. E. Mulgan, A.B., Dunaghy
Rectory.

H. J. Mulholland, Byron street

Wm. Mullan, J.P., Willowvale.

John R. Musgrave, J.P., Drumglass,
Malone.

Joseph John Murphy, F.G.S., Old-
forge, Dunmurry.

Joseph W. Murphy, Stranmillis.

Robert M'Adam, College sq. East.

James M'Clenahan, Ardoyne.

Miss M'Clure, Belmont.

Thomas M'Clure, J.P., D.L., M.P.,
Belmont.

Rev. Edmund M'Clure, Windsor.

John M'Connell, Eglinton street.
 Wm. MacCormac, M.D., J.P.,
 M.R.I.A., Howard street.
 William M'Coyd, Dunluce street,
 Ulsterville.
 George M'Iloy, York street.
 Rev. Wm. MacIlwaine, D.D.,
 Windsor.
 Mrs. MacIlwaine, Windsor.
 Archd. MacIndoe, Donegall pass.
 Daniel M'Kee, Adela place.
 Robert M'Kee, Adela place.
 John M'Kee, Balmoral terrace.
 John Mackenzie, C.E., Balmoral.
 Robt. L. M'Kinney, Fleet street
 Thos. MacKnight, Balmeral terrace.
 George O'Brien, Botanic avenue.
 Thomas O'Brien, Holywood.
 Robert Patterson, J.P., F.R.S.,
 M.R.I.A., College sq. North.
 David C. Patterson, Holywood.
 William H. Patterson, Dundela,
 Strandtown.
 George Phillips, sen., Sydenham.
 James Phillips, Virginia street.
 William H. Phillips, Lemonfield,
 Holywood.
 John Pim, Crumlin terrace.
 Joshua Pim, Crumlin terrace.
 Thomas W. Pim, Evelyn Lodge,
 Sydenham.
 John Preston, jun., T.C.D., Dun-
 more.
 John Pyper, Regent street.
 Thomas Plimmer, Bangor.
 John Reid, Donegall square West.
 Francis Ritchie, The Grove.
 Miss Robinson, Kinnauld terrace.
 Rev. G. Robinson, Tartaraghan.
 Hugh Robinson, Donegall street.
 Ninian J. Robinson, Donegall street.
 W. A. Robinson, Crofton, Holy-
 wood.

Richard Ross, M.D., Wellington
 place.
 Mrs. Scott, Oldpark terrace.
 W. M. Scott, Eglinton place.
 R. C. Sedgewick, Holywood.
 John Shelly, Whiteabbey.
 Thomas Shepherd, Springfield
 terrace.
 William Shepherd, Holywood.
 Thomas Shaw, Pakenham place.
 Daniel Sheriff, Larne.
 W. S. Simpson, The Crescent.
 Miss Sloan, College street.
 George K. Smith, Whiteabbey.
 Robert Smith, Hughes's buildings.
 Thomas Smyth, Kensington street.
 Rev. Geo. C. Smythe, A.M., Carn-
 money.
 Adam Speers, Holywood.
 James H. Staples, Holywood.
 Robt. Stewart, M.D., Falls road.
 Samuel A. Stewart, North street.
 Miss Swanston, University street.
 William Swanston, University st.
 Saml. Symington, Brookfield house.
 Ralph Tate, A.L.S., F.G.S., &c.,
 Queen's row, Grove lane, Cam-
 berwell, London. (Hon. Mem.)
 A. O'D. Taylor, Marino, Holywood.
 Wyville Thomson, LL.D., F.R.S.,
 F.G.S., &c., Strandtown.
 Professor James Thomson, A.M.,
 LL.D., C.E., University sq.
 Mrs. Thomson, University square.
 Miss Thomson, University square.
 Dr. W. G. W. Thompson, Bally-
 money.
 James M. Thompson, University
 square.
 Miss Thompson, University square.
 Henry Thompson, Windsor.
 Mrs. Thompson, Windsor.
 G. Thomson, Springfield buildings.

Miss Thorn, Millbank, Holywood.
 Alex. Threlkeld, Botanic road.
 Miss I. M. S. Tod, College park.
 W. A. Todd, Regent street.
 Robert K. Tomlin, University sq.
 William Valentine, J.P., Glenavna,
 Whiteabbey.
 James W. Valentine, Fortwilliam
 park.
 Abraham Walker, Donegall square
 West.
 T. R. Walkington, Laurel Lodge,
 Strandtown.
 W. R. Ward, Strangford.
 John S. Ward, Lisburn.
 Lieut.-Col. Warrand, R.E., Fort-
 william park.
 Alex. C. Welsh, Dromore (Corre-
 sponding Member).

Edward Weldon, Linen hall.
 T. K. Wheeler, M.D., Clarendon
 place.
 T. K. Wheeler, Jun., Clarendon
 place.
 David Wilson, Ballymoney.
 Miss Wilson, Ballymoney.
 Robert Workman, A.M., Windsor.
 Thomas Workman, Windsor.
 Edward Wren, Lonsdale street.
 Joseph Wright, F.G.S., F.R.G.S.I.,
 Kinnaird street.
 H. J. Wright, Lonsdale street.
 James Wright, Fitzroy avenue.
 Robert Young, C.E., Richmond
 terrace.
 Robert Young, jun., Richmond
 terrace.
 Samuel Young, Roselands.

Any Changes in the Addresses of Members should be communicated by them to the Secretaries.





R U L E S

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the object of the Society be the practical study of Natural Science and Archæology.

III.

That the Club shall consist of Honorary, Corresponding, and Ordinary Members. The Ordinary Members to pay annually a subscription of Five Shillings; and that Corresponding Members be expected to communicate a paper within every two years.

IV.

That Candidates shall be proposed and seconded at any meeting of the Club by Members present, and be then elected by a majority of the votes.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, two Secretaries, and ten Members, who form the Committee. Five to form a Quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of the District. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Fortnightly Meetings be held for the purpose of reading papers ; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These meetings to be held during the months from November to April, inclusive.

VIII.

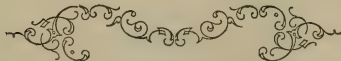
That the Committee shall, if they find it advisable, offer for competition Prizes for the best collection of scientific objects of the district ; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches, or excavations, if deemed advisable ; provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alterations in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary, or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alterations.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.





Belfast Naturalists' Field Club.

EIGHTH YEAR.

THE Committee offer the following Prizes, to be competed for during the Session ending March 31, 1871:—

I.	For the Best Herbarium of Flowering Plants,	£1	0	0	
II.	For the Second Best do.,	...	0	10	0
III.	“ Best Collection of Mosses, ...	...	0	10	0
IV.	“ Best do. Seaweeds, ...	...	0	10	0
V.	“ Best do. Ferns, ...	...	0	5	0
VI.	Best Collection of Cretaceous Fossils,	...	0	10	0
VII.	Do. Liassic do....	...	0	10	0
VIII.	Do. Palæozoic do....	...	0	10	0
IX.	Do. Marine Shells, ...	...	0	10	0
X.	Do. Land & Freshwater Shells,	0	10	0	
XI.	Do. Coleoptera, ...	...	0	10	0
XII.	Do. Lepidoptera, ...	...	0	10	0
XIII.	Best Set of 25 Microscopic Slides, ...	...	0	10	0
XIV.	Best Collection Archæological Objects,	...	0	10	0
XV.	Do. Crustacea, ...	...	0	10	0
XVI.	Do. Echinodermata, ...	...	0	10	0
XVII.	Six Best Field Sketches appertaining to Geo- logy, Archæology, or Natural History, ...	...	0	10	0

SPECIAL PRIZES.

XVIII. Mr. Plimmer offers a Prize of 10s. 6d. for the Best Collection of any or all the above, collected AT THE EXCURSIONS or Field Meetings of the year.

XIX. Mr. Robert Young, C.E., offers a Prize of £1 1s. for the Best Original Measured Drawing and details of some Ruined Building in the Province of Ulster, of not later date than the 15th century.

The Drawings to be submitted to the decision of Dr. James Moore, Mr. William Gray, and Mr. Young.

XX. Professor James Thomson, LL.D., offers A Prize of £1 1s. for the Best Essay and Oral answering on the Optics of the Microscope.

He also offers that, in case of their being not less than three competitors whose performance shall be judged to be such as would deserve the honour of a prize, if one were available, he will give A Second Prize of 10s. 6d. for the Second Best Essay and Oral answering on that subject. Professor Thomson is to be himself the examiner, and to have the decision, unless he gets some well qualified person or persons, as for instance the Professor of Mathematics, or of Natural Philosophy, in the Queen's College to act with him, or, to act instead of him, in the decision. No prize is to be awarded unless very satisfactory merit be exhibited. If one or both of these prizes be not awarded, Professor Thomson will arrange to have the amount reserved for one or more prizes for the succeeding Session, on terms to be afterwards prescribed.

As the primary object is to encourage Members of the Field Club to acquire knowledge on the subject proposed, intending competitors are to be perfectly free to seek and to receive aid from books or from any persons towards acquiring information; but not unacknowledged aid in the composition or revision of the Essay, or of passages in it. The Essays are to be given in to the Secretaries of the Club, on or before the 17th March, 1871.

CONDITIONS.

No Competitor to obtain more than One Prize in any one year.


No competitor to be awarded the same Prize twice within five years.

All Collections to be made personally during the Session within the Province of Ulster. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in flower, and classified according to the Natural System. The Sketches and Drawings to be the Competitor's own work.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful Competitors.

Further information regarding these conditions may be had from the Secretaries.

Presented 11 Feb. 1886.



Presented.

11 FEB 1886

Eighth Annual Report

OF

THE BELFAST

NATURALISTS' FIELD CLUB,

1870-71.



EIGHTH ANNUAL REPORT

OF THE

Belfast Naturalists' Field Club,

WITH

STATEMENT OF ACCOUNTS,

AND

A LIST OF THE OFFICE-BEARERS AND MEMBERS,

FOR THE

Year ending 31st March, 1871.



^BELFAST:

PRINTED BY JAMES HUTCHINSON 35, VICTORIA STREET.

1871



REPORT

OF THE

~~20th Annual Report of the Club~~

EIGHTH ANNUAL REPORT.

ERRATA.

- Page 32, line 35. For "to" read "of."
" 35, line 7. For "r" read "8."
" 40, line 30. For "*Antedon rosaceon*" read "*Antedon rosaceus*."
" 66, line 38. For "Fergus Mor Mac Erok" read "Fergus Mor Mac Erck."

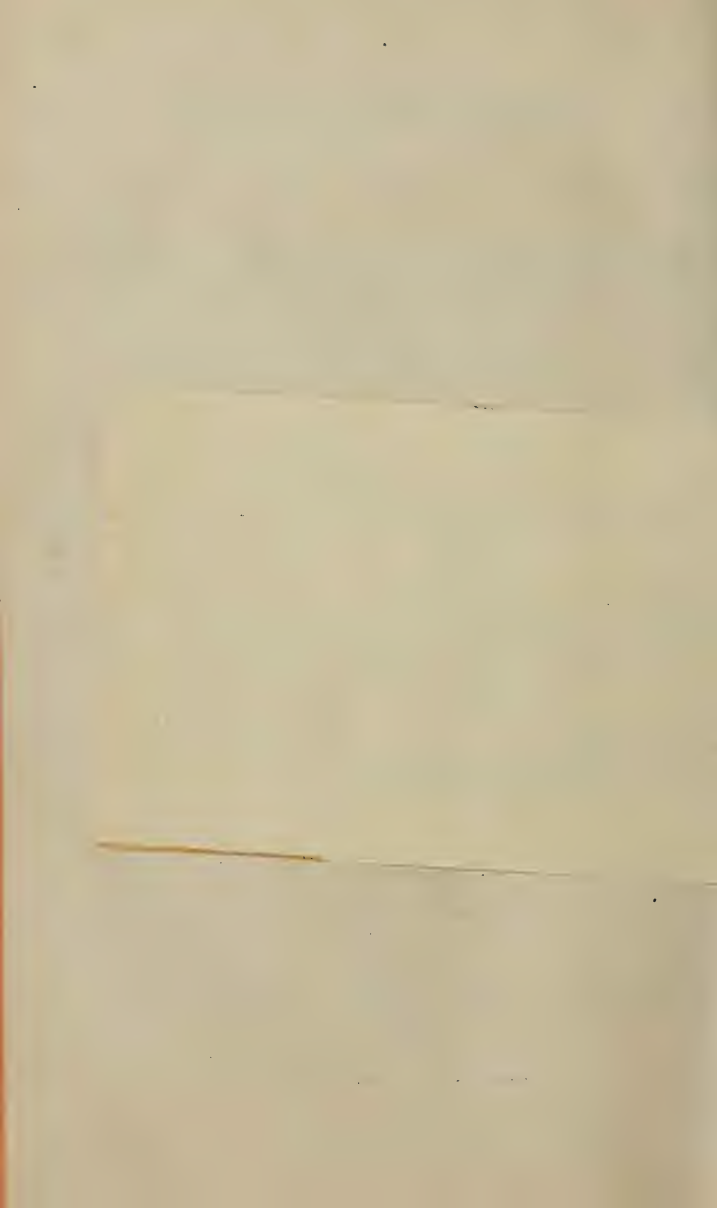
The plate which appears at the end of the Appendix should be inserted between pp. 69 and 70.

A few typographical errors also appear, which are unnecessary to enumerate, as the correct reading will be apparent.

- " ~~13th August, Castledawson and Moyola Park,~~
" 13th August, Castledawson and Moyola Park,
" 3rd September, Strangford Lough.

Detailed accounts of each are appended.

During the Winter Session the following papers were read at the joint meetings of the Club and the Natural History





REPORT

OF THE

Belfast Naturalists' Field Club.

THE Belfast Naturalists' Field Club has now been in operation for eight years, and on no former occasion has its position been more satisfactory, whether we consider its financial position, its working machinery, the zeal of its members, the public interest it has excited, or the public favour it has secured.

As usual, the programme of excursions determined upon was carried out in every particular, and the following places were visited ;—

On the 21st of May, Belvoir Park and Newtownbreda.

„ 11th of June, Annaghmore and Shore of Lough Neagh.

„ 2nd July, Glenarm and neighbourhood.

„ 20th, 21st, and 22d July, Ballycastle and Ballintoy.

„ 13th August, Castledawson and Moyola Park,

„ 3rd September, Strangford Lough.

Detailed accounts of each are appended.

During the Winter Session the following papers were read at the joint meetings of the Club and the Natural History

and Philosophical Society, according to the arrangements referred to in last year's report :—

1870.

- Nov. 2nd.—Opening Address by Robert Patterson, Esq. F.R.S.
 „ „ “Cuttle Fishes.” by Dr. H. Burden.
 „ 16th.—“Visit to a Pre-Historic Manufactory of Flint Implements at Spiennes, near Mons, Belgium,” by Mr. J. H. Staples.
 „ 30th.—“Revolving Storms,” by Mr J. J. Murphy, F.G.S.
 „ „ “The Boulder Clay of the District—The Great Fault in Carrickfergus Commons,” by Mr. Robert Young, C.E.
 „ „ “Smoky Fogs in Belfast,” by Professor Thomson, LL.D.
 Dec. 14th.—“The Final Results of the Lightning and Porcupine Expeditions,” by Dr. Wyville Thomson, F.R.S.
 Dec. 28th.—“The Echinodermata,” by Mr. William Swanston.
 Jan. 11th.—“Newtownbreda and its Neighbourhood,” by Mr. M. Fitzpatrick.
 „ „ 25th.—“The Gulf Stream,” by Mr. J. J. Wilde.
 Feb. 8th.—“A Visit to the Mines of the Black Country, South Belgium, and the Hartz Mountains,” by Dr. J. S. Holden, F.G.S.
 March 1st.—“The Circulating Fluids in Man and Animals,” by Dr. Redfern.
 „ 8th.—“Some Antiquarian Notes about Donegal,” by Mr. W. H. Patterson.
 „ „ “The Latest Fluctuations of the Sea-level on our own Coasts,” by Mr. S. A. Stewart.
 „ 22nd.—“Ocean Currents, and their Effects on Climate,” by Mr J. J. Murphy, F.G.S.
 „ „ “Shrinking and Warping of Woods in Drying,” by Professor James Thomson, LL.D.
 April 5th.—“The Ammonite—its Ancient and Modern Relatives,” by Mr. William Gray,
 „ „ “The Structure of the Palæozoic Crinoids,” by Dr. Wyville Thomson, F.R.S.

Abstracts of these papers are appended.

As the arrangements under which the meetings of the Winter Session were held interfered to a certain extent with the operations of the Natural History and Philosophical Society, your Committee were called upon to consider the arrangements for next year, and an alteration has been agreed on, by which the distinctive functions of each society will be more clearly defined, while their mutual desire to assist and co-operate with each other will not be interfered with. The same number of meetings will be held as formerly, and the meetings of the Field Club will alternate with those of the Natural History and Philosophical Society.

The members of the Club entrusted by the Council of the Natural History Society with the re-arrangement of the objects in the Museum, have continued their labours, and have completed the mounting of the local geological collections. Several members of the Club have contributed specimens from their private cabinets to complete the series ; and your Committee recommend the co-operation of the members generally in supplying what are still wanting.

Your Committee have pleasure in recording that the Council of the Natural History and Philosophical Society, "in recognition of the benefits conferred on the institution" by the labours of the members just referred to, have elected them "Honorary Associates" of that society,

During the past year your Committee, aware of the earnest desire that exists in many quarters that the publication of the *Ulster Journal of Archæology* should be revived, appointed a sub-committee to report upon the possibility of accomplishing this very desirable object ; but, after consultation with the promoters and proprietors of the journal, the sub-committee reported that circumstances prevented the possibility of reviving the publication at present. They do not, however, abandon the hope that either the journal in its former character,

or a similar contribution to the history and archæology of the Province, will be commenced at an early date, and have every reason to believe that such a publication is not only required at present, but would meet with liberal support.

Your Committee, in furtherance of an opinion expressed at one of the meetings held last year, that an aquarium should be established in Belfast, appointed a committee to consult with the Directors of the Royal Botanic Gardens upon the desirability of carrying out the suggestion. This committee reported that the Directors of the Botanic Gardens were most anxious to promote the object in every way in their power, and would gladly give a site for the tanks in the Gardens. The matter is under consideration, and your Committee have every reason to hope that the project will be realised before long.

Your Committee, having out of the treasurer's fund a small sum placed at their disposal for "Geological and Archæological searches or excavations," appointed a sub-committee to explore certain pre-historic remains in the neighbourhood of Armoy, County Antrim. The result of this exploration is embodied in a report which is published herewith.

The Committee have provided a portfolio for the reception of sketches, measurements, or illustrations of Natural History, Geology, Archæology, &c., and again recommend "that the members and friends of the society should embrace every opportunity to multiply records of this description," and send them to the secretaries to be permanently secured in the Club's Sketch Book.

Dr. James Thomson, C.E. ; Dr. James Moore, M.R.I.A. ; and Messrs. John Anderson, F.G.S. ; Robert Young, C.E. ; and S. A. Stewart having been appointed the judges of the Collections sent in competition for the Prizes offered by the Club, have awarded the following:—*Mr.* William Swanston,

for best collection of Liassic fossils. Mr. William Gray, for six best field sketches, illustrative of Geology, Archæology, or Natural History—his sketches being a contribution towards a complete list of the Cromlechs of Down and Antrim. Miss Lester for best collection of Mosses. The special prize offered by Dr. James Thomson was not competed for, but is still available for next year. Mr. Young, C.E., also offered a special prize “for the best original measured drawing, and details of some ruined building in the Province of Ulster, of not later than the 15th century. This prize was awarded to Mr. F. W. Lockwood, for his measured drawing of Bunnamairge Abbey. In awarding the prize for the six best field sketches, the judges also recommended that a special prize should be awarded to Mr. Robert Smith for his admirable water-colour drawing of Colin Glen, and the Committee have acted on that recommendation, and granted a prize equal in value to that given for the six field sketches, which complied with the conditions. Mr. Plimmer’s prize was not competed for, and is still available. The liberality of these gentlemen in offering special prizes entitle them to the best thanks of the Society, and your Committee trust that their example will be followed by other members and friends.

The thanks of the Society are also due to Captain Peel Dawson, of Moyola Park; Rev. George Robinson, of Tarraghan; and Messrs. Herdman, of Ballintoy, for the courtesy and hospitality of those gentlemen when the Club visited their respective localities.

WILLIAM GRAY,	} <i>Honorary</i>
HUGH ROBINSON,	
	} <i>Secretaries.</i>

Dr.

Belfast Naturalists' Field Club in Account with Treasurer.

Cr.

To Balance from 1869-70,	£38 8 3	By Expenses of Conversation,	£10 12 0
" Subscriptions,	52 10 0	" Printing Annual Report,	13 7 6
" Conversation Tickets Sold	8 0 0	" Expense of Plate for Appendix	5 0 7
		" Advertising and Printing,	7 9 9
		" Stationery,	6 16 1
		" Prizes,	1 0 0
		" Curator,	3 0 0
		" Delivery of Circulars,	1 10 0
		" Postages,	4 7 4
		" Loss on Annaghmore Excursion	0 19 8
		" Moyaver Exploration Fund,	1 3 0
		" Balance on hands,	43 12 4
	£98 18 3		£98 18 3

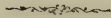
Audited and found correct,

HUGH ROBINSON.

GREER MALCOMSON, Treasurer.



SUMMER SESSION.



The following Excursions were made during the Summer Session :

On Saturday, 21st May, to

BELVOIR PARK,

And its neighbourhood. Owing to the continued wet weather, particularly on the day before and on the morning of the excursion, only a small party met at the appointed hour. Notwithstanding this discouragement, the officers of the Club determined to proceed with the programme, and they were rewarded by having as fine an evening and as pleasant an excursion as any of their former meetings. Calling at Annadale, once the residence of the Duke of Wellington, the party were hospitably entertained by the present occupier, who regretted the party was not larger. Mr. Greer, one of the members of the Club, contributed an account of the history of the locality, and pointed out the several places of interest. According to arrangements made by Sir Thomas Bateson, a guide met the party at the entrance to the demesne, and conducted them through the grounds, the gardens, old graveyard, &c. It may be safely stated that the park scenery cannot be surpassed in the North of Ireland for variety, extent, beauty, or picturesque effects. The several members of the party were more than surprised to find that such really beautiful

scenery existed so close to the town, and frequently expressed their regret that a larger party was not there to enjoy it. Leaving Belvoir, a visit was paid to Drumbo round tower, which the party sketched and accurately measured.

The botanical results obtained were, on the whole, highly satisfactory. From the commencement of the present century the native plants of the district around Belfast have been diligently sought out by Templeton, and other able and zealous botanists who succeeded him. Mr. Tate's "*Flora Belfastiensis*," published mainly for this Club, embodied these researches in a permanent form, and since the issue of that *Flora* a good deal has been done by several of the members in the discovery of species hitherto overlooked, and in ascertaining the range and frequency of occurrence of others. It could not be expected that many rarities still remain unnoticed so near Belfast; nevertheless, there is much to be done before we know all the species that compose our indigenous flora, their distribution, and their comparative rarity or abundance. Several scarce plants were noticed on the occasion of this excursion, and are deserving of record. Among these was one of the rarest of our sedges (*Carex strigosa*), which occurs in only a few localities in the North, and is extremely rare in the South and West of Ireland. The three nerved sandwort (*Arenaria trinervis*) was found growing most luxuriantly, and in the greatest profusion, under the shade of the venerable trees that dignify Belvoir Park. This species is accounted by Irish botanists as one of our rare plants. The white meadow saxifrage (*Saxifraga granulata*) was also found in plenty in the park. It is recorded as occurring in three or four other Irish stations, but is, we fear, only a doubtful native. Be that as it may, however, it is growing here spontaneously and in abundance.

Belvoir Park affords many suitable *habitats* for cryptogamic plants, and two very rare species of mosses were

found growing on trees, viz. :—*Tortula recurvifolia* and *Orthotrichum leiocarpum*. The former is certainly new to our list of Irish mosses; the latter, if before recorded, is extremely scarce.

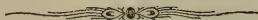
On Saturday, 11th June, to

ANNAGHMORE AND THE SOUTHERN SHORE OF LOUGH NEAGH,

Under the guidance of the Rev. George Robinson, who met the party at Annaghmore station, where a large van awaited them. The character of the region visited is such as to promise the botanical collector a well-filled *vasculum*. The surface of the country exhibits the greatest diversity of *habitats* for native plants. Here are wild moors and fens that yield heath plants and sedges; streams and lakes for fluvials; woods and groves for such as haunt sylvan shades; and a rich soil in the highest cultivation where agrestal plants may luxuriate. The botanist coming from Belfast could not fail to observe that proximity to the "Sunny South" was already making its mark to some extent on the flora. To the observant eye educated in plant lore, this was apparent, not only from the coming in of forms not commonly found in Antrim, but also from the disappearance or rarity of some of our common species that are of a Northern type. The Rev. Mr. Robinson is perfectly familiar with the plants that occur here, and under his guidance all the available time was turned to the best account, so as to secure specimens of the various botanical rarities. Nor were other matters neglected; at several points between the station and the lake the remains of what is called St. Patrick's Road were examined. The road was supposed to have been constructed for the conveyance of sand from Lough Neagh to be used in the building of Armagh Cathedral.

This road was evidently originally, as various exposed sections show, formed on a bog; large blocks of rough timber were laid on the peat, and on the timbers the roadway was formed, chiefly of lough gravel and sand, and presented a hard uniform surface. In some cases the peat seems to have continued to accumulate, and even to cover the road to a depth of four or five feet. On a heath between Annaghmore and Maghery the cranberry (*Vaccinium oxycoccos*) was found growing abundantly. The thread-like stems straggle and twine among the heath and grass of the uncut bog, and are easily overlooked. The tiny rose-coloured flowers, though seldom noticed, are real gems of the moor, albeit in a setting of dingy moss. Here also was found the white sedge (*Carex curta*), which occurs, likewise, in several spots in this neighbourhood. Driving on to Maghery, boats were procured, and the party divided, one section going to Coney or Cunny Island, while the botanical section elected to visit Scawdey Island, in County Tyrone. Scawdey is an uninhabited islet, whose flat surface scarce rises above the level of the waters of the lake. On this little spot grows one of the rarest British plants, the small reed grass (*Calamagrostis stricta*), which has now only two more stations in Britain—one at Oakmere, in Cheshire, and the other at Lough Beg, near Toome. The plant grows in some plenty on Scawdey Island, but in such limited bounds, comparatively slight causes may work its extinction at any time. One rare and beautiful native, the marsh vetchling (*Lathyrus palustris*), that formerly grew on Scawdey, appears to be extinct—no specimen could be found. The soft brown sedge (*Carex disticha*) was found on this islet; it is quite rare in the North of Ireland, though it is seen in several places in this locality. Sedges are a marked feature in the flora of the South shore of Lough Neagh. The panicled sedge (*Carex paniculata*) was met with not far from Maghery. The cyperus sedge (*Carex pseudo-cyperus*) has also been found by Mr. Robinson in the parish, but time did not allow of the

detour required to see the plant growing. Both sections of the party enjoyed their row on the lake, and returning from the islands visited, met again under the shelter of Derrywarragh Point, where the Rev. Mr. Robinson had a sumptuous luncheon laid on the grassy banks for the accommodation of the party, who manifested their appreciation in a very decided manner, and resumed their field work with increased vigour. As the party were on the return from Maghery, Rev. Mr. Robinson pointed out a bank on which was growing luxuriant examples of the royal fern (*Osmunda regalis*), and many fine plants were soon dug up and carried off to grace sundry ferneries in and around our "Linenopolis." Passing Mr. Robinson's residence, a vote of thanks for his kindness was unanimously and cheerfully accorded him. Near Crowhill, the residence of J. Atkinson, Esq., D.L., the wood betony (*Stachys betonica*) was seen growing in considerable abundance. This is an extremely rare labiate plant; it is here perfectly wild, and with every mark of being truly indigenous. The water fennel (*Ranunculus trichophyllus*) was gathered here also, and may be mentioned as one of the rarities that the district yields; it bears floating leaves abundantly, which is a very unusual phenomenon in this species. It will be seen from the above that to the botanist the results were highly gratifying. A great deal of the success was doubtless due to being under the direction of an able local naturalist, who could, without loss of time, conduct to the objects most worthy of being seen. As far as possible such should be the case in all the excursions of the Club.



On Saturday, 2nd July, to

GLENARM PARK.

Although the Club has frequently visited this locality, it is still very popular with a large number of the members. On this occasion a large party left by the 9.30 train from the Northern Counties Railway, and, arriving at Larne, a large van awaited to convey them to Glenarm Park, or what is called the Old Deer Park, which includes the rough slope of the hills within about two miles of Glenarm, on the Larne road. It is remarkable for the number of landslips that have taken place from time to time; and the fallen blocks of white chalk scattered in wild confusion give the coast scenery a most picturesque appearance. The county road runs at the foot of the undercliff, and is constantly disturbed by the shifting nature of the talus resting on the slope of the hill. The exposed section of the cliff shows a succession of beds from the Trap to the New Red Sandstone. The Trap, Chalk, and Greensand rest on the Lias shales and clays, and the water percolating through the Chalk and Greensand softens the surface of the clays, and is the main cause of the landslips just referred to. The Chalk and Lias are well represented, but the Greensand is only represented by occasional blocks in the *debris* which forms the talus from the hills above. The party spent a good portion of the day examining the various exposures, and collected a fair sample of the characteristic fossils of the Chalk, Greensand, and Lias, the latter yielding some good *ammonites*, and fragments of the large bones of the *Ichthyosaurus*. After leaving the Deer Park the party walked to Glenarm, by the "Madman's Window," "The Stepping Stone," and the almost perpendicular chalk rocks that line the shore road. Near Glenarm a visit was paid to the Whiting Mill, where a very considerable trade is done manufacturing whiting from the local chalk rock, and considerable quantities are exported. After an hour's run through the beautiful

scenery of Glenarm Demesne, the party drove back to Larne in time for the last train to Belfast, and thus closed another of the many pleasant trips to Glenarm and its neighbourhood.

On 20th, 21st, and 22nd July, to

BALLYCASTLE AND BALLINTOY.

This was considered the principal excursion for the year, and was looked forward to with much pleasure. On Wednesday morning a large party assembled at the York Street Terminus of the Northern Counties Railway, and left by the 9.30 train for Larne. Mr. M'Neill's van was awaiting the arrival of the train to convey the party to Cushendall, &c. The day was agreeably fine, and the drive along the coast so frequently described in our reports was thoroughly enjoyable. Frequent halts were made at the exposed geological sections, the old ruined castles, attractive glens, and wherever an opportunity was afforded to extract fossils, collect plants, or enjoy special views of the coast scenery. A considerable halt was made at Cushendall, where Mrs. Martin had dinner prepared, which was promptly served up and promptly disposed of, after which the whole party were better prepared for their further drive of fifteen miles to Ballycastle. Leaving the van at Glendun, the party walked up the hill, and on the way gathered a number of ferns, including *Lastrea Oreopteris*, which occurred in great abundance. After a pleasant drive in the cool of the evening, the old glass works of Ballycastle, or "The Port of the Britons," came into view about eight o'clock, and soon after, the party was comfortably made up for the night at Mr. M'Donnell's Hotel.

Early next morning, even before the conductor's whistle sounded, all were astir, and some had taken a walk over the beach, &c., and by nine o'clock breakfast was over, and the

well-laden cars started for Ballintoy *via* Carrick-a-Rede, Descending to the swinging bridge at the latter place, an exposed section of Trap was examined, and in the face of the cutting several fragments of Chalk and Lias were found imbedded, the latter containing obscure fragments of shells ; and some of the members present reported that they had on a former occasion obtained *belemnites* from the same place. As the Trap overlies the Chalk in this locality, the presence of these fragments can only be accounted for, by supposing that they were carried up by the Trap when it was first deposited in a molten state. The majority of the party crossed the celebrated swing-bridge, and visited the salmon fishery on the island. Re-crossing the bridge, they descended to the beach, and walked below the cliffs towards Ballintoy Harbour, and their visit to this wild shore was more than repaid by the many objects of interest that attracted their attention. Close to the path by which they descended, a perfectly circular hole, four feet in diameter, was found in the chalk rock, forming the floor of the beach, and at the bottom was a rounded boulder of trap rock, which explained that the hole was drilled out by the force of the waves acting upon the boulder and giving it a rotary motion, and thus causing it to sink deeper and deeper into the softer chalk rock. Along the shore several caves occur, having the ceilings decorated with splendid tufts of the sea spleenwort (*Asplenium marinum*), of which several good specimens were secured. It was intended to visit the bone cave at Carrick-a-Rede, and Mr. W. Heidman kindly provided a boat for the purpose, but the sea was so rough the boatmen could not effect a landing, and the project was abandoned. Ascending to the cliff near the old Fort or Dun below the Town of Ballintoy, a field was entered in which a large number of well-formed flint flakes were found, one of the members reported that in this field he found on a former occasion several specimens of rude flint celts, and those peculiar forms of flint known as scrapers or thumb-flints.

At Ballintoy a visit was paid to the Harbour and Quarries belonging to Messrs. Herdman and MacKinnon, who quarry large quantities of Chalk and send it to Glásgow, &c., a cave occurring on the quarry site is said to extend inland as far as the Parish Church.

After leaving the Quarries the party visited the undercliff between the Harbour and Whitepark Bay ; here the enormous blocks of trap that are scattered over the undercliff assume most fantastic forms, and here and there the Lias beds crop out along the shore ; but the chief development of this formation is at Whitepark Bay, along the banks of a stream that runs from the cliff to the sea. The chief object of the excursion was to explore this bed, and the whole party arrived at the spot, fairly tired out by the rough walk from Carrick-a-Rede. This fatigue was thoughtfully anticipated by A. F. Herdman, Esq., who had a most substantial luncheon prepared on the grass close by, and in his absence his brother, Wm. Herdman, Esq., dispensed the hospitality of the firm to the satisfaction of all present, Mr. Herdman being assisted by Mrs. and Mr. Dickson, of the Castle, Ballintoy. After luncheon a most hearty vote of thanks was passed to Messrs. Herdman, and the hammers, picks, and shovels were soon in active operation. This bed of Lias may be reckoned amongst the most fossiliferous deposits of that formation in Great Britain. It was known to Portlock, and the species it yielded largely augmented the list of Liassic fossils, published in his Report. Cephalopods prevail in these "Belemnite Shales." The *fauna* is very varied, including many forms not yet found elsewhere ; and this Society has been complimented by having the names of some of its prominent members attached to several of the newly discovered fossils. Thanks to the Messrs. Herdman, those members who took advantage of this excursion had a rare opportunity of getting easy access to the Ballintoy Lias. The Belemnite Shales are cut through by a small stream, and Mr. Herdman

had kindly directed his men to expose the bank at the most likely spots; a vast mass of material full of fossils, was thus thrown down, and a perpendicular section of some 12 feet or more, made available; this was a very great advantage, as it furnished an opportunity for such an examination, as probably the locality never received before. Those whose zeal led them to make the necessary exertion were highly successful, and heavy bags of good specimens were made during the few hours available for the work. Many examples of a large number of species were collected, and the rare chance of finding this bed so well exposed, determined some of the members to make a supplementary excursion to the same ground. This was carried out a few days afterwards, and as this may be considered as a continuation, and result of the Club's visit, the species collected on both days will be included in this report.

The total number of species collected was 33. Portlock (1843) only enumerated 27 species from the Ballintoy beds. Tate (1870) increases this total to 44 species. It will be seen that on the occasion of this visit, specimens were collected of more species than were known to Portlock, and just three-fourths of all the species which up to the present are known there. The following is a list of the fossils collected:—

<i>Ammonites armatus</i> ,	<i>Ceromya gibbosa</i> ,
<i>Ammonites Buvgnieri</i> ,	<i>Cucullæa Grangeri</i> ,
<i>Ammonites Conybeari</i> ,	<i>Goniomya Sinemuriensis</i> ,
<i>Ammonites Greenoughi</i> ,	<i>Leda Bronni</i> ,
<i>Ammonites multicostata</i> ,	<i>Leda Quenstedti</i> ,
<i>Ammonites raricostata</i> ,	<i>Leda tenuistriata</i> ,
<i>Belemnites acutus</i> ,	<i>Limea acuticosta</i> .
<i>Tectaria strophium</i> ,	<i>Lucina Limbata</i> ?
<i>Tornatella Robinsoni</i> ,	<i>Mytilus Gueuxii</i> ,
<i>Anatina longissima</i> ,	<i>Ostrea arcuata</i> ,
<i>Avicula novemcostæ</i> ,	<i>Ostrea irregularis</i> ,
<i>Cardium Philippianum</i> ,	<i>Pecten acutiradiatus</i> ,

Pecten lunularis,	Plicatula sarcinulia,
Pecten textorius,	Unicardium cardioides,
Pecten texturatus,	Rhynchonella plicatissima,
Pleuromya liassina,	Extracrinus Briareus,
Dentalina obliqua.	

An important result of this visit to the Ballintoy Belemnites Shales was the discovery that they abounded in *Foraminifera*. Some specimens of these interesting, though minute forms, were detected by Mr. Gray, and on a close scrutiny it appeared that the shales were exceedingly rich, not only in individuals but also in species. These forms have since then been carefully worked out by Mr. Joseph Wright, F.G.S., and the results appear as an appendix to the present Annual Report.

In the neighbourhood of Ballintoy there are no less than three Cromlechs in good preservation—one on the hill above the rectory, and the other two are on the crown of the hills to the east; the three can be visited within one hour from the town.

Late in the evening the party left Ballintoy for Ballycastle, where another night was spent. Early next morning it was resolved to visit the coal field and Fair Head. As this involved a considerable amount of walking, an early start was made, and the cars were ordered to go on and await the party about four or five miles on the Cushendall road; but even with this arrangement, as it was necessary to go all the way to Belfast the same day, the visit to Fair Head was extremely hurried, and, indeed, it could not be accomplished by any but good walkers. After a smart walk of about three miles, a halt was called at the mines, where coal and ironstone is worked from the face of the cliff. The very fine escarpment of the Coal Measures here gave the members a fair idea of the general character of the Carboniferous system; and as the party rested themselves on the blocks of wrought sandstone and the

miners' little waggons, one of the gentlemen present gave a short description of the various beds exposed, and commented on the economic value of the rocks composing the Carboniferous system. The advance was again sounded, and the cliffs behind the mines were ascended to the height of 600 feet, with scarcely time to stop for breath. "Come on" was still the cry above, and passing the ruin of a cromlech on the headland, and the crannogue in the lake behind Fair Head, all pressed forward for the "Grey Man's Path." Even here little time could be spent to enjoy the grandeur of the cliffs, at Fair Head a short stay was made so as to give each member of the party an opportunity of examining the rocks around, and the almost perpendicular face of the cliff that rises abruptly from the sea to the height of 600 feet. Though this excursion of the Club was mainly directed in reference to Geology, yet Botany was not entirely overlooked, and specimens of several rare plants were gathered. At Ballintoy the brilliantly coloured meadow cranesbill (*Geranium pratense*) abounded, and in wet places by the coast the grass of Parnassus displayed its chaste white flowers. The Quillwort (*Isoetes lacustris*) was found in lakelets on the summit of Fair Head, and the Welsh Poppy (*Meconopsis cambrica*), on steep cliffs at the "Gray Man's Path." The Rose-root Stonecrop also occurred on the same rocks, and likewise a very rare species of moss "*Glyphomitrium Daviesii*." The search for plants at Fair Head was extremely hurried; had further time been afforded this list would doubtless have been considerably enlarged, but the time was very limited, for when the party had just a look at Murlough Bay from the headland above, the conductor declared the time was fully up and that the party must now make for the cars, five miles inland. The whistle was sounded and away they went over bogs, hedges, and fields, heath, rocks, and plantations, in as straight a line as it was possible to make, now panting up a hill-side and then hurrying down the slopes, totally disre-

garding beaten paths and more than astonishing the natives, who could not tell "what the gentle-folk were doing yonder." At length, after a total run of not less than ten miles, the cars were overtaken, and a pleasant drive brought the party again to the Glens of Antrim Hotel at Cushendall, where dinner was awaiting them. An hour rested and refreshed the party, and again the cars were taken for the drive into Larne along the Coast Road, and a continuation of the beautiful weather that the party was favoured with the first day enabled them to enjoy the drive home as heartily as any other portion of an excursion that may be considered one of the most successful of any recorded by the Club.

On Saturday, 13th August, to

CASTLEDAWSON AND MOYOLA PARK.

Moyola Park, the residence of Captain Peel Dawson, situated on the banks of the Moyola river, is a favourite resort for pic-nic parties from Belfast and other towns; and the courteous proprietor is ever ready to open his gates for parties wishing to enjoy a day in his beautiful grounds. The application of the B.N.F.C. was at once acceded to, and the weather proving favourable on the day chosen for the trip, a very agreeable one was spent through the demesne, remarkable to the naturalist chiefly for the number, variety, and condition of its well-grown trees. After visiting the old graveyard inside the entrance gates, the party were conducted by the gamekeeper to a low hill in the park where he was bringing up a large colony of pheasants. Broods of every age were scattered around—some not many days old, and others ready to take the responsibility of their own maintenance in the thick plantations that surrounded them. Tracing the banks

of the river, the track of an otter was observed, and the game-keeper said that that creature was his chief enemy, and gave him very great trouble. Returning by the long avenue between the house and the Maghera road, a specimen of the hay-scented fern (*Lastrea Oreopteris*) was gathered. After thus spending a quiet day's ramble, the party returned to town by train from Castledawson Station.

On Saturday, 3rd September, to

STRANGFORD LOUGH.

This being the last excursion for the year, and the weather being rather unfavourable, only a small party undertook this trip, leaving by the County Down Railway for Saintfield Station. Here cars were provided, and a drive through one of the best-cultivated districts in Ulster—formerly “full of wood and water”—brought the party under the shadow of Killyleagh Castle, that has survived the vicissitudes of many, many years, and is still a beautiful residence. Its original foundations were probably laid in the reign of King John; and by varying fortunes it was sacked, burnt, and battered down from time to time, and as often restored, as it was successively held by the M'Cartans, Mandevilles, Whites, and Hamiltons. It has recently been restored, and is now a noble castellated mansion, overlooking a rich and pleasant country, in which industry and progress is everywhere manifest. Shrigley Mills, the extensive works of Messrs. Martin, of Belfast, form one of its most prominent features, and as a factory is itself a good example of the busy hives that are the peculiar characteristics of Ulster. At Killyleagh the members of the Club visited the birthplace of Sir Hans Sloane, the celebrated physician and naturalist, who founded the British Museum; he was born in Killyleagh, in 1660. The

house is still in fair preservation, and is one of the chief objects of attraction in the town. Leaving Killyleagh, the party drove along the east shore of Strangford Lough to Killinchy—the Church of the Islands—the Parish Church being sometimes called “the Visible Church,” from its prominent position on the hill. From Killinchy the party proceeded to Sketrick Castle, one of the many erected in the 12th century, when Sir John de Courcey made his raid into Ulster. Ringhaddy Castle was another to the south, and Mahee Castle to the north. The party left the Lough late in the evening, and, driving through Ardmillan, came to Comber, where they took the train for Belfast.





WINTER SESSION.



NOTE—The authors of the various papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

THE first joint meeting for the Winter Session of 1870-71 was held in the Museum, College Square North, on Wednesday Evening, 2d November.

THE PRESIDENT of the Senior Society (ROBERT PATTERSON, Esq., F.R.S.) occupied the chair, and made some prefatory observations suitable to the occasion. In connection with the future, he mentioned that in all probability the British Association would hold their meeting of 1873 in Belfast, if not, it would be held here in 1874. Amongst other matters brought forward at the last meeting of the Association in Liverpool was a request which he thought might meet a response from several members of the Societies he was addressing, namely, the request expressed by the Meteorological Committee for a volunteer force of 1,500 or 2,000 scientific observers, who would keep a systematic record of the rainfall in the particular locality of each, by means of the inexpensive rain-gauge now in general use. Particulars would be furnished by G. J. Symes,

Esq., 62, Camden Square, London. With reference to the past, Mr. Patterson explained the progress that had been made during the past summer in the re-arrangement of the collections contained in the Belfast Museum. The fossils had been under revision by Messrs. Stewart, Robinson, Swanston, and Gray, whose untiring labours in that department would be soon perfected. But there were other departments, particularly the Archæological one, in which the Museum was peculiarly rich, whose re-naming and classification would involve the continuous attention for some time to come of several members of the two societies so harmoniously working together for one common object. More such workers were needed, and he hoped they would be forthcoming. The collection of coins had been named and carefully recorded in a special book by the Rev. Richard Oulton and Mr. W. H. Patterson, who had prepared a report thereon. To all the gentlemen mentioned, and to others whose general assistance was always ready, the council of the Museum felt extremely indebted. As regards the special winter work—namely, the reading of papers of a scientific and varied character, he had reasons to anticipate a pleasant and instructive session lay before them.

DR. HENRY BURDEN then read a paper on "Cuttle Fishes." He exhibited and handed round for inspection a specimen of one of our native species of cuttle fishes—"Sepiola Rondeleti;" and described its external appearance, directing particular attention to the dark purplish-brown spots with which the surface of the body was covered. These, he said, were due to the presence in the integument, of cavities filled with granules of pigment. The cavities, which were called chromatophores, were remarkable for the variations in size and form they experienced under different circumstances. The mechanism by which these changes were effected was explained. The lecturer then proceeded to say:—"Having clipped off a piece of the skin from the living animal, I placed it upon the stage of a compound microscope and examined it with an inch power. The

chromatophores could then be seen to dilate and contract at intervals, assuming during the process a great variety of forms, the principal ones being circular, fusiform, stellate, and annular, sometimes one would entirely disappear to start forth again in a few moments in undiminished magnitude. The chromatophores continued to undergo the variations in size and form just described, in a portion of the integument which have been removed from the rest of the body many hours previously. The wonderful play of colours exhibited by the living animal was shown to result from the action of the chromatophores." Dr. Burden stated that he had obtained several living specimens of *Sepiola* last summer at Orlock Point, near Groomsport, and had kept them alive in a glass jar filled with salt water for many days. It was one of these specimens that he now presented to the notice of the meeting. He then described their amusing habits; the rapidity with which they change colour when alarmed or irritated; the peculiarity of the dark fluid discharged from the ink bag, which did not diffuse itself so as to conceal the animal as in other cuttle fishes; the ingenious manner in which the creature buried itself all but the eyes, in the sand, &c. The anatomical structure of the animal was then briefly sketched. The recent researches of Hensen, with regard to the anatomy of the eye, were alluded to. The relations of the pigmentary and nervous coats of the eye, which had for a long time been a source of perplexity to physiologists and anatomists, were shown to be strictly in accordance with the laws which regulate the transmission of luminous impressions to the sensorium in other cases. The animal—the appearance, habits, and structure of which had been described—was adduced as an example of a well defined class, designated, from the position of the feet, Cephalopoda; all the individuals included in which were believed to agree with each other, and differ from every other animal in the arrangement of the lobes of the divided foot in the form of a circle round the head, and in the

possession of a respiratory and locomotive funnel, formed by a modification of the morphological structures termed *Epipodia*. Well authenticated accounts of cuttle fishes of enormous size were quoted. The length of one of these was said to be 39 feet." The lecture was illustrated by numerous specimens and diagrams.

On Wednesday evening, 16th Nov., MR. J. H. STAPLES read a paper on "A Visit to a Pre-Historic Manufactory of Flint Implements, at Spiennes, near Mons, Belgium," of which the following is an abstract :—

When spending some holidays in Belgium this summer he heard from some friends of the existence near the town of Mons, in that country, of ancient excavations in the chalk rock for the purpose of obtaining the flint for the manufacture of stone implements. He was able to spend a day at Mons in order to see these remains. In the house of a M. Houzeau de Lehaie, a gentleman living at the village of Hyon, near Mons, he saw a great collection of flint weapons, and other objects found in and about the ancient works, and from this gentleman he was, at the end of the day, given as many specimens as he could take. First he went to a place called the Camp à Cayaux—Camp à Cayaux is the Mons dialect for the French *Champ à Cailloux*, that is, field of flints. It is thickly strewn with broken flints, imperfect and broken flint weapons, and also good specimens could easily be obtained after a little search. These are the remains of an extensive flint implement manufactory at this place; and at the other side of a small stream called *La Trouille*, the excavations, pits, and galleries into the chalk for the purpose of extracting the flint can be seen exposed by the cutting of the railway which runs through this place. The fields on which the remains of these ancient works are found form a table-land, or plateau, intersected by two rivers—*La Trouille*, just

mentioned, and Nouvelles. They flow in narrow valleys or ravines about eighty feet deep. The works are now completely filled in and covered over by the refuse after the flint had been extracted, and by clay and sand subsequently washed in.

A report was drawn up in the year 1867 by a committee appointed to watch the cutting of the railway in that year, in consequence of the discovery of human bones in the field called the Camp á Cayaux. These bones were found to have no relation to the other more important remains that the railway soon laid bare. The committee was composed of M. Houzeau de Lehaie and two other gentlemen. Their report gave a good description of the geological strata, and engravings of the various types of implements. Human relics were found of two quite distinct periods, both pre-historic; the more modern are those in connexion with the extensive works and quarries in the chalk, chiefly near to the ravine of La Trouille, and covering an area of upwards of fifty acres now spread over with flints, blocks of chalk, clay, and refuse of all kinds from the quarrying of the rock. The more ancient are a few rudely chipped implements of the drift type found in connexion with bones of extinct mammalia, and in a deposit laid down before the surface of the country had obtained its present shape.

The newer or neolithic weapons of the excavations are found absolutely in cart-loads. From their shape it is evident that they belong to the age of polished stone, but they appear to have been only chipped into form at this manufactory, and polished elsewhere. A great many instruments of deer horn, which appear to have been used as hammers, a few bone implements, fragments of coarse pottery, and gritstone anvils, and grindstones or millstones for grinding corn, were found in the excavations amongst the refuse; also bones of several wild animals now living in Europe; also portions of the skeletons of dog, cat

and ox. The bones that were found most plentifully were those of red deer, which were very abundant ; remains of wild boar were also numerous. Human bones were found buried in one of the pits ; the skull was long-shaped, the jaws not projecting, the forehead prominent, but low, These remains were strictly confined to the surface, or to the pits and excavations communicating with it ; no appreciable change had taken place in the surface of the country since their epoch.

The remains of the more ancient period are quite different in this respect; they consist of only a few rude but unquestionable weapons, all of them found in a bed of broken flints, chalk, and gravel, that is evidently a deposit formed in the bed of a rapid river, which must have flowed at a height of eight feet above the beds of the rivers La Trouille and Nouvelles, and therefore before their ravines had been cut out of that depth of chalk ; bones of rhinoceros, mammoth, cave bear, cave hyæna, and other extinct animals were plentiful in this bed. Since its deposition and consequently since the time of the men who made the weapons found in it, the ancient river has slackened in speed, and a considerable thickness of clay, loam, and sand has been deposited by the running water over the flints ; over this a bed of brick clay has been formed, partly by the flooding of the rivers which had altered their channels, and partly by the the action of rain bringing down mud from the higher grounds. These two beds of clay over the flint bed have attained a thickness of forty feet in the cutting of Spiennes, or the land between the two rivers, and twenty feet in the cutting of Mesvin, which is beyond the River Nouvelles. After all this, again, the rivers must have cut out their ravines through a thickness in some places of eighty feet of chalk rock, which they have removed from off large areas ; finally, in the bottom of the ravines the streams have deposited a thickness of about five feet of sand, peat, and alluvial mud.

Some idea of the vast time all this must have taken may be obtained when it is remembered that the more recent remains of the polished stone age show no change at all to have taken place since that era, except perhaps the deposition in the ravines. This is shown by these remains being found exclusively on the surface or in excavations, and also down the slopes of the little valleys cut out before their time.

In the opinion of the reader, it is difficult to escape from the conclusion that considerably more than the few thousand years, in which it has been supposed that the human race has only been in existence, must have elapsed since the deposition of the bed in which the more ancient implements are found.

On Wednesday evening, 30th November, Mr. J. J. Murphy, F.G.S., read a paper on "The Geographical Distribution of Cyclones or Revolving Storms," of which the following is an abstract:—

Cyclones appear to be formed only over tropical seas. They are not formed over the land (though when once formed they sweep over it), because an abundance of watery vapour is needed in order to supply, by its condensation in the upper regions of the atmosphere, the heat which expands the air, and by so doing constitutes the motive power of the storms. For a very different reason they are not formed on the equator. A cyclone, or revolving storm, has its origin in the meeting of two winds blowing in opposite directions, but deflected by the rotation of the earth under them. This effect is in opposite directions in the Northern and Southern hemispheres. In the Northern hemisphere it causes the cyclone to revolve in a direction *opposite* to that of the hands of a watch, and in the Southern to revolve *with* the hands of a watch. These are the directions in which the rotation of the earth would appear to be, to an observer situated in space and

Looking down on the North or South pole respectively. Being opposite in the two hemispheres, the effect of the earth's rotation on the winds is null at the equator, and consequently cyclones are not formed there, nor do they cross it.

Cyclones are formed along the line where the northern and southern trade-winds meet; but for the reason stated above, they are formed only where that meeting takes place at some distance from the equator. For this reason they do not occur all round the globe, but are restricted to particular regions and seasons. They do not appear to be formed over the greater part of the Pacific, because the two trade-winds there meet on the equator; and they are not formed over the South Atlantic, because the two trade-winds (the north and the south) have not their meeting over that ocean at all. But they are formed over the West Indian Sea, and most numerous in summer and autumn, because in those seasons the trade-winds of those seas have their meeting-place furthest from the equator; and for the same reason they are formed at the same period of the year off the coast of California. But the most instructive facts about their distribution are to be found in the Indian Ocean and Chinese Sea. There the meeting-place of the two trade-winds follows the sun as he moves between the northern and southern hemispheres, and the locality of the cyclones varies accordingly. In the summer of the southern hemisphere (that is to say in the winter of ours) they are formed over the Southern Indian Ocean: in the summer of the northern hemisphere they are formed over the Chinese Sea: and in the intermediate seasons, that is to say in the months following the equinoxes, they are formed in the intermediate locality, over the Bay of Bengal.

This subject has been worked out in detail, by an examination of ships' logs, by Mr. Meldrum, whose results were read to the Meteorological Society of Mauritius on 24th March, 1870,

and stated in abstract in *Nature* of 23rd June, 1870. The writer of the present paper has endeavoured to show that the same theory will account for the distribution of cyclones wherever they are formed.

MR. ROBT. YOUNG, C.E., on the same evening read papers on "The Boulder Clay of the Belfast District," and "The Great Fault in Carrickfergus Commons." He stated his reason for now bringing the first subject prominently before the society—that in a former communication, in which the successive elevations of the land had been discussed, the variety and extent of the topics had not permitted his doing more than giving a brief glance at this important formation, which in other quarters is occupying the attention of distinguished geologists, and that since that time he had been able to explain some of the formerly obscure and intricate questions associated with the subject, in respect of the origin, distribution, and age of the beds. As regards the position or geological age of the boulder clay, it may be said to form a coating of unequal thickness over a great portion of the denuded surface of the entire rock series of the Counties of Antrim and Down, from the granite and gneiss series on the one hand, to the traps on the other, and resting indifferently and unconformably on the Silurians, Carboniferous, Permian, Triassic, Liassic, and Cretaceous. Speaking in general terms, it is a mass of unstratified tenacious clay, containing immense quantities of rounded and frequently polished, grooved, and striated boulders, also angular blocks more or less polished and striated, both of these not only of the local rocks, such as the Silurian slates, sandstones, chalk, and trap beds would furnish, but also of syenites, porphyry, rose-quartz, mica slate, jasper, and granite, differing from any in these counties and indicating a north-westerly origin. In size these vary from a hand pebble to masses weighing twenty tons and upwards, and the striation in the boulders is always in the line of the longer axes. Where the underlying rock is to slate, trap or

Carboniferous limestone, two remarkable things are found associated. 1st—As the clay comes nearer to the bed on which it rests it becomes more and more dense and tough, resembling in some places a solid rock, and quite as difficult to cut through, and the colour changes from the usual reddish tint to a dark grey or bluish black, corresponding in a measure with that of the present rock. 2nd—The surface of the rock is found to be cut off to a general plane, covered with flutings or shallow grooves frequently highly polished, and scratchings on these grooves, not parallel but forming slight angles with each other, but all in the general direction of the grooves. The upper surface of boulder clay hills varies very much in some parts of the district, sometimes forming a series of undulations, which are quite unconformable with the rock below, and frequently taking the shape of detached rounded masses. In the first case the hollows are often filled with beds of sand, gravel, and finely laminated clay; and very often in sections of these rounded hills, when exposed in railway or other cuttings, their beds of fine sand and gravel are found at a short distance from the subsoil, and having the same curvature as the surface, and in these beds minute and greatly worn fragments of wood have been observed interstratified. In excavations made during the building of the County Antrim Jail, some very remarkable sections were obtained; in one where, at a depth of about ten feet through this clay, the Keuper marl beds were reached, it was observed that large lumps of fine sand were dispersed in a confused way through the clay, and mixed up with these were many roots and portions of trees. In another section, a short distance from this, a bed of finely stratified sand interposed between the marls, and a thin vein of clay, without boulders, supporting other strata of sand. It was pointed out that the characteristic phenomena of this formation were unique, being different from any of the previous deposits in earlier epochs of the world's history, and that some new cause, or set of causes, not hitherto at work, must

have come into action. The other members of the Tertiaries had been deposited in quiet lakes, estuaries, or seas, with mud and sand, and shingle, derived from lands adjoining them, and enjoying a warm climate, but a tremendous change must have ensued at the close of the Pliocene period in respect of climate, probably due to a great change in the distribution of land and water in both Europe and North America. It was shown that a depression of the whole surface of this island must have taken place, till the depth of at least 2,000 feet below the sea was reached ; that during this probably gradual fall and equally gradual rise again, an enormous amount of denudation of the rocky beds must have taken place, partly from the action of land ice in glaciers, but mainly from the much greater energy of the ice-fields and bergs, which must have been at work at this period, just as they are now in both high northern and southern latitudes, grinding down and cutting through submerged lands, over which they are driven by strong sea currents, and as they melt or overturn, throwing down the load of rocks, clay, and sand with which they are freighted, to mix in a heterogeneous way with the mud bed already formed by the grinding action of the ice, both land and sea. In the upward movement of the land there seems to have been pauses from time to time of very lengthened periods. Some of these can still be plainly recognised by the continuous lines of eskers or old sea margins, which are very remarkably preserved in the great central limestone district of Ireland, sometimes only faintly indicated by a shallow bench or terrace on a steep hill-side ; sometimes by a line of old sea-caves, as in our own locality, and the last line of elevation is familiar to most, in the cliff which lends such a picturesque charm to the margin of our Lough, and can be traced around the shores of the British Islands at a height of about twenty-five feet above present sea-level. In conclusion, it was shown that this theory, as now briefly explained supplied a solution to the following difficulties:—1. The

presence of foreign rocks in the clay and associated beds 2. The polishing and striation of boulders and blocks. 3. The polishing and scratching of the parent rocks in situ. 4. The darker and more dense clay being next the rock. 5. Partial stratification near surface of clay hills. 6. Masses of sand, roots of trees, &c., in the clay. 7. Eskers and sand and clay beds with shells. 1. Erratic or perched rocks. In explanation of this paper a large map of Ireland was exhibited showing the contours of the country when submerged to depths of 500 feet, 1,500 feet, and 2,000 feet, and also a diagram illustrating the complete actions of land and sea ice upon a coast line where there is a considerable rise of tide.

Mr. YOUNG next explained, by means of a large map of the district adjoining Carrickfergus, the line of a great fault or down throw in the Trap, Chalk, and other beds below them extending across the Commons, the higher level of the Chalk where it is exposed being about 600 feet. and the lower escarpment being about 400 feet above sea-level. He adduced reasons for concluding that the gap in the steep rocky face of the Knockagh, known as the Stony Glen, was on the western extremity of this dislocation, thence it was traced to a point on the South Woodburn, where a reservoir had been intended for the Belfast water supply, but prudently abandoned. It is then found on the North Woodburn, at a short distance below the new reservoir on that stream, and thence passes through the open Commons to the curious cavern of Lignaca, near Lough Mourne, from which cavern there is an underground channel to the well-known Sulla Tober, where a considerable stream bursts forth at the base of the lower Chalk escarpment. The entire district southward of the line indicated has therefore been depressed about 200 feet, and this occurred probably during the last term of the glacial period. The eastern boundary of this fault has not yet been clearly determined.

Dr. JAMES THOMSON then offered some remarks on the smoky fog of Saturday evening, the 26th of November. People in many cases at first thought the smoke pervading their apartments was coming from some of the fires within their own house; and the truth subsequently became apparent that Belfast was enveloped in a densely smoky fog. The smoke remained most disagreeably evident, apparent to the eyes, and perceived almost suffocatingly in the throat, even in warmed apartments. What, then, could be the reason why the air of the town should at that particular time, when the mills were closed, be fifty-fold, or perhaps a hundred-fold, as smoky as usual? Mere calmness of the atmosphere would not suffice to account for such excessive smokiness. He thought the explanation of the phenomena in question was afforded by a theory which he had submitted to the Natural History and Philosophical Society in February, 1868. The view he then gave, and which he thinks meets with confirmation from the atmospheric phenomenon of the Saturday and Sunday, was to the effect that the usual or general cause of excessively smoky fogs is the arrival in the sky over a town of a vast influx of warm air, much warmer than the air lying calmly on the ground, and immediately over the houses. The mingling of the two masses of air at different temperatures must tend, according to well-known laws, to produce cloud or mist at their junction, especially if both, although clear, be nearly saturated with moisture in the gaseous state. If the substratum of cold air be of considerable depth, the first indications of the arrival of warm air may be a clouding of the sky, and a rise of temperature at the ground, due to radiation of heat downwards from the newly arrived air; the warmth at the ground often in such cases showing itself by an incipient thaw, if there has been frost before. Then, as time advances, the cold substratum may be gradually thinned away by the scouring off of its upper part by the current of warm air flowing above it, till the foggy junction where the inter-

mixture is proceeding extends down to the houses and the ground. In this way there may be brought about a condition in which the lowest air will be the coldest, and in which there will be a gradual increase of temperature in ascending for a considerable height from the earth. If now the newly-arrived warm air maintains a brisk flow there certainly will be no smoky fog, because the smoke will be carried away as quickly as it is evolved from the chimneys. But if, with the distribution of temperature already supposed to have been attained, a calm supervenes, we have a set of conditions present together which can scarcely fail to produce a smoky fog; because the coldest and heaviest air, being at bottom, must tend to stagnate there, all upward and downward currents, such as often at other times occur, being then arrested. Thus, in the stagnating lower stratum, the smoke emitted as usual from the chimneys must accumulate excessively; and if the newly arrived warm air be moist enough to produce fog by its mixing with the cooler air below, as must often be the case, the accumulating smoke will be accompanied by fog, and so the smoky fog will be produced. If the newly-arrived air over the substratum of colder air be warm and not very moist, an excessive accumulation of smoke may occur in the atmosphere of a town in calm weather without there being necessarily any fog—the main conditions tending to an extraordinary accumulation of smoke being, a calm atmosphere with a cool stratum at bottom and warmer air above; and with the cool stratum extending high enough to cover the chimneys of a town, and receive their smoke. On the other hand, if the upper air be cool, the air of the town may be kept clear and fresh without any perceptible wind, by a constant gentle interchange of air upwards and downwards; the warm air of the town floating upwards and being replaced by the cool air from above.

On Wednesday evening, December 14th, Dr. WYVILLE THOMSON, F.R.S., delivered a lecture on "The final results of the 'Lightning' and 'Porcupine' Expeditions."

Dr. THOMSON referred briefly to previous lectures he had delivered in the Museum, explanatory of those deep sea researches, in which, during the last three or four years, he had been engaged in conjunction with other naturalists. Not very long ago, the conditions existing at the bottom of the sea had been examined to the depth only of some 80 fathoms. Naturalists had imagined that living organisms grew fewer and fewer the deeper down one went, and, judging from the incomplete data then obtainable through private dredgings and other observations, had arrived at the conclusion that a zero of life existed at about 300 fathoms. But recently, owing to improved appliances, and from the fact of these observations being conducted from British Government vessels, in the very best possible way, with the best instruments and most complete machinery, under skilled supervision, dredging had been successfully effected from a depth of about 2,500 fathoms—say $2\frac{1}{2}$ miles down. The principal depth, however, at which the observations of his colleagues and himself had been made, had been from 500 fathoms, over a district lying along the western coast of Europe. Instead of there being a zero of life at these depths, life existed in numberless and beautiful forms. The special object of his present address was to describe, in rough outline, what kind of life existed at these great depths, and what relations the forms existing there bore not only to present but extinct fauna. At 800 fathoms, forms of life were found—including nearly all the Echinoderms—which we had been in the habit of terming boreal, because it was only in Arctic seas, though in much shallower water, we had hitherto had any opportunity of becoming acquainted with them. Now, these had been dredged off the coasts of Spain and Portugal at 600 to 800 fathoms. From careful examination and collection of facts, the truth seemed to assert itself

plainly that the fauna of a sea bottom was not materially affected by mere difference of locality, but was regulated by similarity of temperature. The cold water similar to that of the Arctic Seas prevailed at these great depths, and in fact this might be alleged regarding about three-fifths of the earth's entire surface. Therefore, where this low temperature existed, which it did over a vast region, the same form of life prevailed. Bands of temperature in the ocean and bands of fauna were correspondent. The more southerly investigations were proceeded with the deeper down were the coral forms found. This statement, of course, does not embrace those portions which are affected by warm equatorial currents, notably by the Gulf Stream. When the dredge touched on that region below, influenced by the Gulf Stream, the fact was immediately recognisable by the great difference in the forms brought up in the dredge. But, as regards Arctic forms, let it be understood that even off the coast of England such can be found, if we go to the proper depth. The relations which many of the forms discovered sustained to the Tertiary fossils of Sicily, and to fossils found in old formations, were spoken of; and, in connection with existing species, it was mentioned that many species had been dredged in the northern seas similar to, but not quite identical with those found in Australian and southern seas. Many species, altogether unknown before to scientific men, had now been discovered in these great depths, especially in the sponge family, whose headquarters seemed to be in the abysses of ocean. In fact, as regards sponges, these recent dredgings had been accumulating new forms so rapidly that the lecturer believed we were not yet in a position to attempt any classification of them. Dr. Thomson then described minutely, and exhibited some most beautiful specimens of deep sea sponges, sea urchins, starfishes, and crinoids, captured during his last cruise in the summer of 1870.

On Wednesday evening, December 28th, Mr. WILLIAM SWANSTON read a paper on the Echinodermata. He commenced by referring to the deep sea dredgings recently carried on from her Majesty's ships Lightning and Porcupine, which by the magnitude and importance of their results, made the attempts of local naturalists seem insignificant by comparison. Nevertheless, dredging even from a small boat in our own bay affords enjoyment of a high order, and may be made to yield a very great amount of instruction. Much also remains to be done before we can fairly claim to know fully the distribution of animal life, even in our own waters, and much patient work is to be accomplished ere we understand as we ought, the structure and habits of these creatures. The echinoderms are separated from other animals by distinctive characters, which the reader pointed out. They are divided into six orders, founded mainly on their organs of locomotion. The first of these groups includes the creatures popularly known as "feather stars;" although now nearly extinct, it was of the highest importance in past geological epochs. In it were included the encrinurites or "stone lilies" of the Palæozoic, and the pentacrinurites and other allied forms of the Mesozoic Seas. The marbles of Armagh show how abundantly crinoids must have flourished in the Carboniferous era; while in the blue clays of Islandmagee we find the stems of the Pentacrinus in such profusion as proves that even up to the Liassic period, they held an important position. The structure of the crinoids was then explained. Though now nearly extinct, yet a representative still lingers on our coasts. This is the "rosy feather star" (*Antedon rosaceon*), distinguished by the gracefulness of its structure and the exquisite colouring it displays while living. The discovery so lately made by Drs. Carpenter and Thomson of splendid specimens of new genera of crinoids, which live at great depths, may be said to be the crowning success of a series of most brilliant discoveries. The examination of

living crinoids has tended to verify the conclusions of palæontologists regarding this remarkable group; and it may be taken as certain that now, when beautiful and perfect examples have fallen into the hands of such able naturalists, all doubtful points in their history will be cleared up. The second order of the Echinodermata is composed mainly of the sand stars and the brittle stars, species of which are abundant in our bay. They are most active in their habits, and have a strange faculty of dismembering themselves when captured, so that there is some difficulty in preserving specimens entire. This appears to be a provision for the safety of the animal. The dismembered starfish has a power still more strange, by which the lost limbs are replaced by new ones. Specimens are often found in which new portions are in course of growth from the broken rays. "*Ophiocoma neglecta*" a very small and rare brittle star, is recorded by the late William Thompson as found in Strangford Lough, and also near Bangor; it may however, be found in abundance on the zosteria banks at Hollywood. The third order consists of the so-called "cross-fish," or five-fingers, sun stars, bird's foot star-fish, etc. It is represented in our waters by a number of species, of which "*Uraster rubens*," the common cross-fish, "*Solaster papposa*," the sun star, are the most abundant forms. This group of Echinodermata had its origin very early in geological time. The lower Silurian rocks present us with star-fishes almost identical in appearance with the "*Uraster*" of the present day. Through all the vast changes that have taken place since the deposition of the Cambro-Silurian rocks, this group has maintained its place and is still flourishing. The fourth order contains the numerous families of the "sea urchins," the species of which present great variety of appearance as well as much elegance of structure. This group is also a prolific one at the present day, and has been an important one in most geological epochs. The fossil "echini" are amongst the most highly prized objects of the geological collector. The sea cucumbers and sea girkins form

the next order. Many of them—some of rare species—occur in our locality. They have little in their appearance that is attractive, and having no shell or hard external covering they are not found as fossils, though, doubtless, they were represented in the seas of past eras. The “*Holothuriæ*” are endowed with a singular recuperative power; they have the habit, when caught, of ejecting their entire viscera and tentacles, leaving the collector with only their empty skin; so strong, however, is their hold on life, that the animal still lives, and in a short time is furnished with a brand new set of internal organs. The “*Synapta*,” which is plentiful on the Holywood banks, breaks itself into a number of small fragments, to the chagrin of him who has been at the pains of digging it up out of its native mud.

The paper, of which the above is a *resume*, went into the subject in much detail, and was illustrated by many choice specimens, both recent and fossil.

On Wednesday evening, January 11th, Mr. FITZPATRICK read a paper on “Newtownbreda and its Neighbourhood.”

Having described the physical geography of the valley of the Lagan, the paper proceeded to sketch the early history of the district as the north-western extremity of Dal-Araidhe or Down, and southern boundary of the ancient territory of Uladh. During the Pagan times, the early Christian era, or the wars or family quarrels of the O’Neills and O’Donnells, but little mention is made of the locality, except in general reference to the district of Dal-Araidhe, of which Saul, Downpatrick, Moira, and Castlereagh of late seem to have been the centres. It is, however, supposed that the village of Breadac or Bradach existed previous to the fifteenth century, as a dispute is recorded as having occurred (A.D. 1442) between “Nellanus McMalawy and Thomas O’Meaig as to the right

to the rectory of Breadac, when the Primate decided in favour of the former, and directed Patricius Pallidus O'Gallmyre, a principal parishioner, to call in the assistance of Aodh Buide O'Neill, in case the secular arm should be required." The decay and dilapidation of the parish churches of Knock and Breadac caused the two parishes to be made one, at which time the church of Knockbreda was built on its present site at the entrance to Newtownbreda. It is still a matter of doubt as to whether the original village of Breadac was situated within the demesne of Belvoir or occupied the site of the present village. It is, however, clear that the old church was enclosed in the cemetery within the demesne. Whether rebuilt or removed, it is more than probable that during the eighteenth century, and perhaps part of the seventeenth, the village of Newtownbreda occupied the present site. Its position on the highway to the agricultural districts, and its proximity to Belfast, caused it at this time to become a station of considerable importance. It was also at this date inhabited almost exclusively by nailors, whose fires at night attracted the attention of passengers by mail coach, who passed through the village. By a covenant dated 13th October, 1623, the castle and lands of Castlereagh were conveyed by Con O'Neill to Moyses Hill, ancestor of Michael Hill, of Hillsborough, and progenitor of the founders of the noble houses of Downshire and *Dungannon. The estate of Belvoir continued in possession of the Dungannon family for some time, and afterwards became the property of Sir Robert Bateson, Bart., only son of Thos. Bateson, Esq., of Orangefield.

After having sketched the present condition of the village, the paper proceeded to take the principal places in detail, and described the old highway and the village church (which is stated to have been designed by Cassel,

* Second Foundation.

the architect of Leinster House, and the same who gave the first sketch for the Irish Houses of Parliament). The village churchyard was then described, when the touching inscription on the Rainey vault, and the epitaph on the tomb of Rowe, the celebrated comedian, were read and commented on. The female school, the parish school, the post office, village library, the petty sessions, Old Breadac Cemetry within the demesne, the mansion of Belvoir, and Belvoir Park were then passed in review. The paper was illustrated by a general map and several sketches of the locality, prepared for the purpose by Mr. Fitzpatrick.

A very animated discussion followed the reading of the paper, and several members referred to the fact that the late Duke of Wellington, when a boy, resided at Annadale with his mother. From the statements made at the meeting, it would seem that the event really occurred beyond doubt.

On Wednesday evening, 25th January, a paper was read by Mr. J. J. WILDE, on "The Gulf-stream," of which the following is an abstract:—

The series of observations carried on by the officers of the United States Survey from 1845 to 1850, as published by the late Professor Bache, establish the existence of the Gulf-stream as a broad and deep current of warm, almost hot water (80°-84° F.), which issues out of the Straits of Florida at the rate of from 3 to 5 miles an hour, and flows in N. and N.E. direction along the east coast of the United States, but separated from the latter by a current of cold water of Arctic origin, running in the opposite direction. Contrary to the opinion hitherto entertained, which assigns Lat. 45° as the northern limit of the Gulf-stream, Dr. A. Petermann, of Gotha, in his recent publication on this subject

[see Geogr. Mittheilungen, Heft VI. and VII., 1870, and maps] brings forward strong evidence to prove the extension of this current to the western shores of Europe, and into the Arctic Ocean. His curves of temperature embody the results of more than 100,000 observations on the temperature of the North Atlantic at all seasons of the year, and point out the Gulf-stream-current as the principal, if not the only, channel by which the warm waters of the Equatorial region are transferred into the North Atlantic and Arctic Oceans.

The Deep Sea Explorations carried on on board H.M.S. Lightning and Porcupine from 1868 to 1870 by Dr. Carpenter, Professor Wyville Thomson, and Mr. J. Gwynn Jeffreys have revealed the existence of a deep stratum of warm water reaching down to a depth of 800 fathoms, and extending along the west coast of Ireland, Scotland, and the Shetland Isles. Other temperature observations of even more recent date [see Petermann's Geogr. Mittheil., Heft XII., 1870, and Heft I., 1871] show that the stratum of water of Equatorial origin continues along the west coast of Norway, passes round the North Cape, where it sends off one branch towards the western coast of Spitzbergen, another branch towards the west coast of Nowaja Zembla, and a third along the shores of Lapland and the White Sea.

The principal permanent cause of the Gulf-stream-current as Sir John Herschel lays it down in his Physical Geography, must be looked for in the action of the Trade-winds. Owing to the combined influence of the S.E. and N.E. Trades a large mass of water is carried from the northern and southern hemispheres towards the Equatorial regions, from whence, after its temperature has been raised to about 80° F., it is driven into the Caribbean Sea and the Gulf of Mexico, where it undergoes a further heating process. At last, flowing out of the Straits of Florida, under the name of the Gulf-stream, it spreads itself over the North At-

lantic Ocean in the shape of a fan, as previously described. James Croll [see *Philosophical Magazine* for 1870] has calculated that the quantity of heat conveyed by the Gulf-stream through the Straits of Florida, and thence into the northern half of the North Atlantic basin, is equal to the heat received from the sun by 1,560,935 square miles at the Equator, most of this heat being derived from the southern hemisphere.

The Anti-trades, or S.W. winds, which prevail in the North Atlantic during the greater part of the year, and probably also the easterly tendency of a current flowing with a certain velocity from the Equator towards the higher latitudes, must be looked upon as causes which favour the accumulation of Gulf-stream water in the narrower portion of the North Atlantic basin. It seems impossible to dissociate the great oceanic currents from the permanent and the periodical currents of the atmosphere. A glance at a physical chart reveals the remarkable parallelism which exists between them. Moreover, the action of the winds on water, and the facility with which they originate currents in the direction in which they happen to blow, are matters of daily observation and of considerable importance to the practical navigator. It remains with the opponents of this theory, advocated by Benjamin Franklin, Humboldt, Sir John Herschel, and other trustworthy authorities, to discover an equally simple and equally efficient cause of oceanic circulation.

Henceforth oceanic currents must be looked upon as one of the most powerful agents in the distribution of temperature over the surface of the earth, and their influence on climate such, as almost to invert the effects of latitude, creating the conditions of a temperate or even tropical, climate within the Arctic circle, and *vice versa*, transferring the conditions of an Arctic climate to the vicinity of the tropics.

On Wednesday evening, 8th February, Dr. J. S. HOLDEN, F.G.S., of Larne, read a paper on "A Visit to the Mines of the Black Country, South Belgium, and the Hartz Mountains." He said that South Staffordshire well merited the popular name of the Black Country, abounding, as it does, with coal mines and iron forges, rendering the district black above and below; with a night glare of countless fires making the gloom almost Plutonic. The coal field is surrounded by Permian and New Red Sandstone rocks, and rests unconformably on the Silurian, which, in some parts, is upheaved, bearing the coal with it. What distinguishes the coal field of the Black Country from all other coal fields is the running together of many seams without partings, forming, as seen near Dudley, a bed 10 yards thick, with an outcrop showing the strange sight of a cliff of coal 40 feet high for 100 yards. Another peculiarity is the sudden faulting of the coal seams when they meet the Permian boundary, and are entirely lost. Last summer a company was formed to seek them by sinking through the Permian, near West Bromwich. Already a permanent shaft has been sunk 40 feet, but no coal discovered yet. A successful issue is confidently expected, and this would be encouragement to renew the efforts made in Antrim to sink for coal through our New Red Sandstone. Basalt occurs in the Black Country; in some places it intrudes and overlies the coal seams, changing a valuable 12 feet into a worthless, earthy coke of 2 feet. At Bentley is a small quarry of basalt, which might compare with the Giant's Causeway rock, so perfectly columnar is its structure. It is quite an island, as coal is mined all underneath it. The varieties of the modes of working the coal and iron mines were described. Dr. Holden joined an excursion of South Staffordshire mining engineers to the coal fields of Belgium, where the Government gave every facility to their examining the mines between Mons and Liege. The great peculiarity of this district is the contortions and zig-zag folding of the coal seams, so that one

acre yields as much as five of horizontal beds. The enterprise and skill of the Belgian engineers deserves great praise. A novel sight to Englishmen is the crowd of girls and women who work down the mines, all dressed in male attire. They are intelligent and active, speak only the Walloon dialect, and earn $1\frac{1}{2}$ to 2 francs per day. The largest ironworks in the world are near Liege, at Suaing, covering 181 acres, and founded by an Englishman, Sir John Cockerell, fifty years ago, and are certainly one of the sights of Belgium. They make everything from rails to locomotives and steamboats, and have extensive orders even from England. Dr. Holden next described a walk through the Hartz Mountains before the war fever, and gave an interesting account of the lead mines, smelting works, and the zinc process used there for desilverising the galena. The subject was illustrated by diagrams, specimens of fossils, ores, &c.

On Wednesday, the 1st of March, Professor REDFERN, of Queen's College, delivered a lecture on "The Circulating Fluids in Man and Animals," of which the following is a brief abstract :—

Every tissue is interested in the circulating fluid. It concerns the life of every one of them ; it is essential to their action ; from it the secreting organs derive the materials for the manufacture of their secretion ; it yields the excreted matters to the excreting organs, and furnishes the pabulum for the growth and nourishment of every part of the body ; incessant demands are made upon it by every part of the organism through which it circulates. Two circulating fluids have been observed in members of the vertebrate sub-kingdom. The most obvious character by which these may be distinguished from each other is their colour, which is red in one case, and white in the other. In other respects the fluids are

very similar, differing chiefly in the degree of organisation or vitalisation to which they have respectively attained. The white may be regarded as the first step towards the formation of the more highly endowed red fluid. In only one vertebrate—viz., Branchiostoma, or Lancelet, is the circulating fluid white. The two fluids circulate in distinct systems of vessels. The red fluid, or that one which is usually referred to when the term blood is used, exists in man to the amount of about one-tenth the weight of the body. The mistakes which have been made, and the difficulties which have been encountered in the determination of the exact quantity of blood in the body, offer a good illustration of the necessity for proceeding in all physiological inquiries according to well-devised philosophical methods. The lecturer then proceeded to describe the consistence, colour, odour, taste, temperature, reaction with litmus paper, &c., of the blood; the phenomena accompanying its coagulation; the method of separating and estimating the quantity of the corpuscles; the size and shape of the red blood corpuscles in man and the lower animals. The following statements were then made:—In man the diameter of a red blood corpuscle averages $\frac{1}{3500}$ th of an inch, and its thickness about one-fourth of that magnitude. As a rule, the red blood corpuscles of quadrupeds are smaller than those of man—the elephant, in which they are $\frac{1}{2700}$ th of an inch being an exception. The Napu musk-deer has very small corpuscles; their diameters seldom exceeding $\frac{1}{12000}$ th of an inch. In reptiles, on the other hand, the corpuscles are comparatively large, being as great as $\frac{1}{387}$ th of an inch in the Proteus. A cubic inch would contain 70,000,000,000 human red blood corpuscles; that is to say, eighty times the population of the globe. White corpuscles are found in the blood in the proportion to the red, of 1 to 226 in boys; in men, 1 to 346 and in old men, 1 to 381. An interesting phenomenon presented by the white blood corpuscles is the remarkable changes of form they exhibit when examined under the micro-

scope. These changes of form and the resulting movements of the whole corpuscle have been compared to the actions of certain protozoa, called *Amœbæ*. With reference to the chemical composition of the blood, Professor Redfern directed attention to the following facts:—The blood is composed of 78 parts of fluid and 22 parts of solid matter. Of the twenty-two solid parts, fourteen may be assigned to corpuscles, seven to the albumen, and one-fourth of a part to fibrin. In addition to these, which are the principal constituents, there exists a small proportion of various salts—chiefly common salt, or chloride of sodium. The chlorine of the salt supplies an essential element to the gastric juice, while its soda is related in a similar manner to the secretion of the pancreas. Whatever other purpose the red blood corpuscles may serve in the economy, carefully conducted experiments lead to the conclusion that probably their most important function is to convey oxygen, and to nourish the muscular and nervous tissues, while observation indicates a striking relation between the proportion of red corpuscles of the blood, and the strength and nervous energy of an animal. Here the lecturer stated that he thought it worth recollection by the ladies present, that the proportion of globules in the blood is much larger in men than in women, and that the variations in quantity are far greater in women than in men. This means greater capacity for physical and intellectual exertion in men than in women; and also greater uniformity in such actions at different periods. There are people who tell us that the world has got upside down, or that it should be turned so—that in the very struggle for existence, women must needs labour like men, and in the same fields of exertion too. And Darwin tells us that the weaker individuals of races of animals have been crushed out of existence by the stronger ones. What will happen in the struggle now going on in society? It is not man's fault that he has got more globules in his blood than women have—if he prove stronger he need not be blamed.

But it may be said it is by intelligence we shall conquer. Is it so in the world? Was it not brute force that settled the dispute between two of the most civilised nations of Europe just now? No! It is not thus that woman must conquer. She must not, she will not forsake her place in nature and in society. She will continue to conquer by affection and sympathy, as she has been wont to do, and continue to call to her aid those small but powerful armies of hers that prattle about one's knees and charm away more than half the ills of life. The albumen of the blood amounts to about 60 or 70 parts in 1,000. If there be a much smaller proportion than this, dropsy results. Albumen is insoluble, unless an alkali be present; hence the alkaline condition of the blood is essential. The apparent facility with which albumen can be converted in the living body from the colloidal into the crystalloidal state, and *vice versa*, seems to fit that substance in a peculiar manner, for the part it plays in the animal economy. The amount of fibrin which can be obtained from healthy blood amounts to between two and three parts in a thousand; but, in the course of certain diseases, it may rise to five or six times this quantity. Fibrin, among other good offices, repairs injuries, fills up breaches of substance, stops hæmorrhage from divided blood vessels, confines and limits the extension of collections of matter, and prevents the hæmorrhage which would otherwise take place on the separation of gangrenous parts. The development and maintenance of the blood, more particularly with reference to its corpuscles, was next treated of, and the spleen, thyroid gland, thymus gland, supra-renal capsules, and lymphatic glands, were said to be sources from which the corpuscles are derived after the individual has attained a certain stage in development, the original corpuscles being, on the other hand, simply a portion of the primitive cells of the embryo. It was also stated that in health the blood is maintained at a uniform standard of composition by the action of the tissues generally, as well as by that of the

glands specially set apart for the purpose. The lecturer then explained the process of coagulation. The following are some of the facts to which he alluded on this subject :—The rapidity with which a coagulum is formed, and also its amount, consistence, and composition, are affected by a variety of circumstances. When cold blood is warmed it coagulates, and when warm blood is further heated it coagulates. Contact with foreign bodies promotes and accelerates the process. This explains why when a needle is introduced into a bloodvessel of a living person, a coagulum forms itself round it—a circumstance of which advantage has been taken in the treatment of disease. It also accounts for the fact that when the coats of a bloodvessel are diseased, and thereby act as foreign substances, the walls of the vessel become coated with coagulum. Arrest or retardation of motion is favourable to coagulation. The addition of water at first promotes coagulation, but when the quantity is large it stops the process. A low specific gravity of the blood favours coagulation. Almost all substances added in small quantity promote, but in large quantity retard the formation of a clot. An atmosphere of ammonia prevents coagulation ; and hence probably the similar effect produced by tobacco smoking, which causes an increase in the amount of ammonia present in the blood, and at the same time produces languor and debility. It has been observed that of boys educated in the same schools in Paris, those who used tobacco never stood as high in the prize list as those who did not. It must be admitted, however, that tobacco smoking did not prevent the German boy from thrashing the French boy, while the English boy looked on. That condition of the system which accompanies faintness promotes coagulation. The blood appears incapable of yielding a clot, after poisoning by antimony, phosphorus, arsenic, amylene, &c., or after death from cholera or typhus fever. The blood of a turtle may be kept fluid by its own living heart, or that in a tortoise for days ; but it will at once coagulate when allowed to escape.

Mammals' blood will not remain fluid when placed in a turtle's heart. It does not seem living enough to preserve such highly organised blood in a fluid state. Blood drawn from the body immediately after death coagulates firmly; but if even a short interval be permitted to elapse between death and the evacuation of the blood no coagulation takes place. Carbonate of ammonia occurs in the blood in cholera and fever. In yellow fever the blood is as fluid as port wine, its corpuscles are dissolved, and it is strongly ammoniacal, the breath and excreta being also charged with ammonia. The introduction of ammonia, by artificial means, into the blood produces symptoms resembling those of typhus fever; namely—dry and dark tongue, involuntary actions of the muscles, ending in convulsions, insensibility, great sensitiveness to sounds, obscure vision, and death from coma. An excess of lactic acid in the blood gives rise to the symptoms of rheumatism. This fact has been demonstrated by experiments performed on the lower animals, in which lactic acid was injected into their blood vessels. Certain conditions of the body lead to fibrinous deposits within the blood vessels or in the heart, in consequence of which the circulation may be suddenly arrested and death ensue. Losses of blood, syncope, exhaustion, the action of saline purgatives may produce such an effect. The truth seems to be that the vital changes in the blood must go on steadily, or its natural relations to the body cannot be maintained. In pneumonia a patient may be doing well when, unexpectedly, he becomes restless, his features assume a death-like expression, and he sinks rapidly and dies. A *post-mortem* examination reveals the cause of death in the shape of a clot in the right side of the heart. Other illustrations of sudden death from a similar cause were given, and it was pointed out that these mishaps arose from the proper balance between the various constituents of the blood having been disturbed, in some cases by a diminution in the quantity of the corpuscles, in other cases from a draining away of the fluids

by an incautiously administered purgative. Professor Redfern concluded in the following words :—Enough has been said to convince you of the importance of the health of the blood, perhaps sufficient to make some afraid to eat or drink, to make this or the other effort. If there be any such, let me comfort them by calling to their recollection that anything they have heard can make no difference in the actions of the organs and tissues of their bodies, and that whether they know what goes on within them or not, the security which our wonderful organisation affords will not be diminished. There are some people who think, and I believe I have one or two young friends who think with them, that if the whole world could but be taught physiology, and the laws of health be as strictly laid down as mathematical formulæ, physical and intellectual health would improve in proportion, and we should live in something like an elysium. I confess I am not so sanguine. The springs of human life and action are not to be fettered in that way. They are far too numerous and distant to be reached in this simple manner. We must toil on, hope on, trust on. When we witness the rise and fall of imperial thrones, or hear of the accumulation of millions on millions of money by a fortunate railway contractor, I do not know that we need envy their possessors. In my estimation we should do more wisely if, on arriving at our respective abodes, we recall the many blessings heaped upon us, and resolve to be content therewith, and strive to do our duty to the best of our ability, each one in the sphere in which he or she has been placed.

On Wednesday evening, 8th March, Mr. W. H. PATTERSON brought forward a short paper giving an account of some investigations he had made regarding antiquities in the South-Western part of the County of Donegal, including the district from Donegal town westward to Glencolumbkille. The places

particularly mentioned were Inver, formerly Inver-Naile, where church was founded by St. Natalis; St. John's Point, with the ruins at Ballysaggart, or Prieststown, MacSwine's Bay and Castle, &c. Mr. Patterson described some of the antiquities in Killaghtee parish, more particularly the neighbourhood of Bruckless, with a well dedicated to St. Conall, and near it is a curious old disused cemetery called "The Relig," at which place is to be seen a very old monumental stone with crosses sculptured on each side, but bearing no inscription. At the same place is a small stone with which St. Conall's name is associated, and which is held in the highest reverence by the country people, and is considered efficacious in curing diseases, for which purpose it is often taken away, but is always returned. A very elaborate monument of Celtic design is to be seen at the Rev. Mr. Stephen's church in Killybegs, where it is now securely built in the wall; it was removed from Ballysaggart ruins. Tradition assigns it to Nial Mor MacSwine, who was lord of that territory many centuries ago. Mr. Patterson described the mountain of Sliab Liag, on the summit of which is a well under the patronage of St. Hugh MacBreac, who founded a church there; this well is the resort of pilgrims during the summer months, who bear their offerings of bowls and dishes of delf, and leave them about the well. The paper was concluded by a notice of Glencolumbkille, with its station, crosses, and monuments.

On the same evening, Mr. S. A. STEWART read a paper on "The latest fluctuations of the sea-level on our own coasts." He commenced by stating that the subject he had to bring before the meeting was connected with the last chapter of the geological record, or rather a few of the latest paragraphs of that chapter. He referred to the fact that the sea-level had never remained constant for any great period—reckoning geologically. During the Glacial period the last

movements on a grand scale were displayed—movements so vast, even in our own region, that he could not help thinking that the term “cataclysmal” was properly applicable to them despite the protest of a powerful and imperious school of modern British geologists, who will not admit the words—cataclysm or catastrophe into the geological vocabulary. At the close of the Glacial era a period of comparative repose was ushered in. But the rest was only comparative; the Quaternary gravels, esker ridges, raised beaches, and estuarine clays since formed, prove that the geological forces are still active, and have not ceased working since the times of the boulder clay. Movements of elevation can be shown in some places; in others, depression seems to have occurred; while many localities exhibit evidence of alternate elevation and subsidence. The latter was undoubtedly the case here; and, indeed, it is likely to be established ultimately that these upward and downward movements of the land were not only general but simultaneous over the country. At an era subsequent to the Glacial drift the land here stood at a higher elevation than at the present. This is shown by submarine peat mosses and buried forests found on both sides of the bay, on the shores of Strangford Lough, on the shores of County Antrim, and at many points round the Irish coasts, as also in England and Scotland. The submerged forests are succeeded in our bay by a deposit of estuarine clay, composed of the silt of the existing estuary. The various harbour improvements carried on at Belfast afforded good chances for examining this clay, and noting the shells entombed in it. The number now collected exceeded one hundred species, and from the character of these fossils it could be inferred that changes of level had taken place during the time the sediment was being deposited. The subject was treated at length. The following is a summary of the conclusions arrived at:—1. Era of submerged peat. The land some thirty feet higher than at present—shore fringed with

low-lying woods—hazel, alder, and marsh plants predominant. This period was subsequent to the boulder clay period, and is synchronous with the times of the sunken peat beds of the South and West of Ireland, with the Norfolk and Somersetshire submerged peat and forests, and with similar growths now found buried below the ‘carse clays’ of Scotland. 2. Era of *Scrobicularia*. The land depressed to some ten feet or thereabouts lower than at present—deposition of several feet of clay on a muddy flat shore—littoral shells in the ascendant. 3. *Thracia convexa* period. Further depression—deep water where our quays and docks are now built—littoral shells replaced by shells of the coralline and laminarian zones. This is the time that corresponds with the recent deposits of clay, on various points of the Irish and English shores, and also with the time when the old coast line of Scotland stood some forty feet higher than that now existing. 4. Elevation. The present sea-level established here—similar upward movements in England and Scotland, as shown by raised beaches, and inland cliffs and terraces.”

On Wednesday evening, 22nd March, 1871, Mr. J. J. MURPHY, F.G.S., read a paper on “Ocean Currents, and their Effect on Climate.”

Mr. MURPHY began by stating that Maury’s “Physical Geography of the Sea,” though it has done good by attracting attention to an interesting and important subject, is full of errors, and is now in a great degree superseded. Some of the most important data on the subject of ocean temperatures and ocean currents have been obtained in the deep sea explorations of H.M.S. Porcupine, in the Atlantic, in the summer of 1869, and in the Mediterranean in the summer of 1870. In both seas the temperatures at great depths were ascertained by letting down registering thermometers. This had been

done in Sir James Ross's Antarctic voyages, but it is now known that the results then obtained were falsified by the pressure of the water at great depths on the thermometers, which caused the readings to be too high. The thermometers are now "protected" in a way that gets rid of this source of error; and they show the water at great depths in the Atlantic to be of a temperature not much exceeding the freezing point of fresh water. This cold water must have come from the Polar seas. There is a superficial current, or rather drift, from the Equatorial to the Polar seas, and a return drift from the Poles to the Equator at a great depth. This is due to the heating of the Equatorial surface water by the sun, so as to expand it and make it lighter; it consequently flows off towards the Poles, where it is cooled, contracts, becomes heavier, sinks down, and flows as an under current back to the seas whence it came.

In the Mediterranean everything is different. The waters of the Mediterranean are nowhere below about 50° of Fahrenheit's thermometer, even at depths which in the Atlantic are almost icy cold. This shows that the cold bottom waters of the Atlantic do not enter the Mediterranean. Unlike the Atlantic, the bottom waters of the Mediterranean contain more salt than the surface waters. A current flows out of the Atlantic through the Straits of Gibraltar into the Mediterranean; and it was ascertained by means of a "current drag," invented for the purpose, that there is an under-current in the opposite direction, from the Mediterranean into the Atlantic. The explanation of these facts is as follows:—The Mediterranean loses more water by evaporation than it receives from rain and rivers, and the surface current flows in at the Straits of Gibraltar to supply the deficiency. The surface water has its salt in some degree concentrated, in consequence of the evaporation, and thus it becomes heavier and sinks to the bottom. Were the Straits of Gibraltar a mere river, the effect

of this would be to concentrate salt in the Mediterranean until its waters began to deposit salt in their bed. But they are of a depth comparable with that of the Mediterranean; and under these circumstances the under-current just described is a necessary result of hydrostatic principles. What has been said does not explain the fact of the bottom water of the Mediterranean being, during the summer when it was examined by the Porcupine expedition, about 20 degrees colder than the surface water. Mr. Murphy offered the following explanation:—That the surface waters are not constantly sinking down, but sink in the winter only, when, after being condensed by the concentration of salt in the summer, they are further condensed by cooling; the permanent temperature of the bottom water is consequently the winter temperature of the surface.

The case of the Baltic is converse to that of the Mediterranean. It receives more water by rain and rivers than it loses by evaporation. A surface current flows out of the Baltic into the German Ocean, and an under-current in the opposite direction. The currents at the entrance to Baffin's Bay appear to be similar to these. There is a surface-current out of Baffin's Bay and the Atlantic, and the existence of an under-current has been shown by a vast iceberg, the submerged part of which acted as a "current drag," and caused it to drift rapidly in the direction opposite to that of the surface current.

The currents of the ocean are greatly influenced by the winds. In the Equatorial seas the surface waters are driven westward by the trade-winds; they are thus forced into the Gulf of Mexico, and escape through the strait between Florida and Cuba into the Atlantic, forming the Gulf-stream. It is often said that the current of comparatively warm water which flows past our shores and into the Polar Sea is a continuation of the Gulf-stream; but in this there is the same kind of con-

fusion that is made about the source of a river. We say that the Rhine rises in Switzerland, but it would be quite inaccurate to say that all the water which flows past Rotterdam into the German Ocean has come from Switzerland. Just so, the Gulf-stream is a large tributary of the current that flows past our coasts, and yet it is not certain that it would make any sensible difference in our climate if the isthmus of Central America were to sink down so as to permit the waters of the Gulf-stream to flow onward into the Pacific instead of back into the Atlantic. What conclusively proves the truth of this view is that the comparatively warm stratum of surface water has been found to be three hundred fathoms in depth near the Shetland Islands, while the Gulf-stream is not more than fifty fathoms in depth at the furthest point toward the north-east—that is to say, at the nearest point to our shores—at which it can be distinguished as a current. In the foregoing statement the views of Dr. Carpenter have been given with but little addition.

The effect of the ocean on climates is two-fold. The capacity of water for heat is greater—that is to say, it absorbs more heat when it is heated, and gives out more heat when it is cooled—than any other substance. For this reason the ocean has the effect of moderating the extremes of both summer and winter; it is well known that the climates of coasts and islands are much more free from extremes than those of the interior of continents. Besides this, the ocean has the effect of distributing the heat of the tropics over the globe; this is done partly by the agency of currents, and partly by the heat becoming latent in watery vapour when it is evaporated, and being liberated in watery vapour when it is condensed. By these two agencies an immense quantity of heat is transported from the tropical to the temperate and polar regions, with the effect of lowering the temperature of the former and raising that of the latter. There is no doubt of

the truth of the general belief that the very mild climate of these islands is mainly due to the drift of comparatively warm water which washes their shores.

On the same evening,

Dr. JAMES THOMSON, C.E., read a paper on "Shrinking and Warping of Woods in Drying," of which no abstract has been furnished to the Secretaries.

On Wednesday evening, April 5th, Mr. WILLIAM GRAY delivered a lecture on "The Ammonite: its Ancient and Modern Relatives." After giving a general description of the geology of the north-east of Ireland, he referred to the white limestone or Chalk, and the Blue Lias below the Chalk as the representatives of two of the great groups into which geologists divide the rocks which compose the earth's crust. The Chalk being the most recent, and the Lias the oldest, they embrace elsewhere a series of rocks several thousand feet thick, and denote a period of geological time when a peculiar kind of shellfish lived, called the Ammonite, a creature that became extinct before our limestone cliffs were elevated from the sea bottom, where the Chalk was first deposited as mud, like that now forming in the Atlantic. They, however, lived for ages previously, and even on the shores of the old sea in which our limestone was formed, the then living Ammonites might have been found with the long-fossilised remains of the generations of Ammonites that crowded the ancient sea in which the Lias rocks were formed, just as we now collect the Chalk and Lias Ammonites on the shore of Larne Lough, mixed up with the living shells of the adjoining sea. From the first appearance of this genus in

the old Lias seas until the close of the chalk period, more than four hundred different species lived, all differing in size, and shape, and ornament. Many were from three to four feet in diameter, while some were small as our smallest shells, more or less ornamented, and from their attractive appearance they have excited the attention of the learned and the vulgar in all ages. The Ammonites are commonly known as "Ram's horns," a form they very much resemble. The vulgar term "Ram's horns" is just the same as the learned term "Ammonites." The original term was *cornu ammonis*, so called from the fancied resemblance between this fossil and the horn that sometimes ornamented the statue of Jupiter Ammon, and the old term *cornu ammonis* is sometimes corrupted into the term "Horn of Moses," and this again into "Cornamoneys," by which the Ammonites are sometimes known in the North of Ireland. Wherever we find this Chalk or Lias in the North of Ireland these fossils may be found; indeed, wherever those beds are found in any part of the world, there Ammonites are found. They have been found in the Lias many thousand feet high on the Himalaya mountains, and of the very same species as we get at Larne, Islandmagee, or Ballintoy. All the Ammonites were chambered shells, very like the well-known Nautilus; indeed, the latter is a very near relation of theirs, from which it differs chiefly in the character of the partitions that divide the several chambers of which the shell is composed; in the Nautilus the partition is plain, in the Ammonite it is foliated. Many other families of chambered shells existed and became extinct long before the first Ammonite. Some of its ancient relations lived even before any of our coal fields were deposited. The remains of them are found in our Carboniferous Limestone, as, for example, the limestone of Castle Espie, in the County Down, where monster shells are found from four to six feet long. These shells are called Orthoceratites. The term "*Orthoceras*" is simply "straight horn," and the

shell itself is like a *Nautilus* unrolled ; it has similar chambers, and similar partitions, and the different genera include shells of every degree of curve, between the involute shell of the *Nautilus* and the straight shell of the *Orthoceras*, the same variety occurs in the class of shells, chambered like the *Ammonite*, and include something like fourteen hundred species, every one of which are fossil, and now extinct, except the *Nautilus* ; and, strange to say, the *Nautilus* was among the very first of the relatives of the *Ammonite* that appeared in the world, and has outlived the vicissitudes of time that caused the extinction of hundreds of its relatives, and now lives in the sea, as it did before our white limestone was formed, or before the *Lias* was deposited, or even before our coal beds were laid down. What a struggle for existence it must have been ! All the genera just mentioned possessed an external shell, but the *Ammonite* had relatives that had no shell, although they belonged to the so-called shellfish group. The cuttle-fishes, for example, ancient and modern, are relatives of the *Ammonite*, and they all belong to the "*Cephalopoda*," or "head-footed" section ; because they have their organs of locomotion situated about their heads. Many cuttlefishes live in the present seas, they are captured in the trawls of *Carrikerfergus*, and in the fishermen's nets of *Groomsport* ; but what are thus taken in *Belfast* harbour are diminutive in comparison with the monsters reported to have been met with particularly in the Northern seas, where it is said they were powerful enough to grasp a boat in their arms and drag it to the bottom. Although these creatures have no shell, they protect themselves by a certain inky fluid, which they pour forth in the face of their pursuers, and under cover of the cloud thus made in the water, they make their escape. The great bulk of the shell-less *Cephalopoda* are recent or living forms, but certain families are found fossil, and they are generally represented in the rocks by the internal shell or bone they possess. The *Belemnite*, so very common in the rocks of

Antrim, was of this nature ; it now occurs as a hard pointed spear or pencil-like substance. This once formed the internal bone of a kind of cuttlefish, like the cuttlefish of our waters, which has an internal soft bone—known as cuttle-bone, and used for various purposes ; but besides the internal bone, the very inkbag of the fossil Belemnite is often found in the Lias rock, and still contains the black ink intended for the protection of the creatures in old Liassic seas, ages before the hills of Antrim were formed ; for the creature was extinct before the white limestone was lifted from the deep sea waters in which it was originally deposited. Besides the soft cuttlefish, with internal bones or straight shells, another family, the “*Spirula*,” had an internal chambered shell, very like the Nautilus, and another family, the “*Argonauta*,” or paper Nautilus, had an external shell, but not chambered. The *Spirula* is not found in fossil, but the *Argonauta* is found in some Tertiary deposits.

On Wednesday evening, 19th April, the closing meeting of the session was held, at which Professor WYVILLE THOMSON, LL.D., delivered a lecture on “The Structure of the Palæozoic Crinoids,” in which he sketched the anatomical structure of the recent representatives of the group, and showed that, though some of the subdivisions found as fossils are represented by modern examples, yet there were others to which no corresponding recent species could be referred. He proceeded to state, however, that quite lately a minute study of recent crinoids (in which he had himself taken part) had thrown much light upon the structure of the whole series of palæozoic groups, and had proved that many recent specimens were more closely allied to the ancient fauna than had formerly been believed. At the close of the lecture a farewell address was read by the Chairman from the council of the Belfast

Natural History and Philosophical Society to Professor Thomson. The latter then read a feeling reply. Mr. Anderson, Vice-President of the Belfast Naturalists' Field Club, then proposed Professor Wyville Thomson as an honorary member of the Club. The motion was seconded by Mr. William Gray, and carried by acclamation. Dr. Thomson said he accepted with the warmest thanks the honour conferred upon him. Mr. R. Patterson, F.R.S., President of the Natural History Society, then made some concluding observations relative to the original members of the society and other matters, and stated that he was, himself, the only one whose lot it had been to remain in active connexion with the society since its first formation up to the present date. The proceedings of the meeting then terminated.

The Annual Meeting of the Club was held on Wednesday evening, 26th April, Professor James Thomson, LL.D., C.E., occupied the chair.

Mr. Wm. Gray read the Secretaries' Report, and Mr. Greer Malcolmson the Treasurer's, both of which were unanimously adopted.

Mr. GRAY then read the following:—

“REPORT OF A SUB-COMMITTEE APPOINTED TO EXAMINE SOME
ANCIENT REMAINS IN THE NEIGHBOURHOOD OF ARMOY,
COUNTY ANTRIM.

The Province of Ulster was anciently called Ulidia, derived from Ollamh Fodhla, a monarch of Ireland about six centuries before the Christian era. (The Ultonian dynasty was overthrown by the Three Collas, A.D. 332.) At a later period the term Ulidia or Uladh was applied to a territory comprising the County Down and part of Antrim, as far as Island Magee, Larne, and westward to the Bann; in the third century the name was changed to Dalaradia, while the remain-

ing portion of Antrim constituted the territory of Dalriada, from Carbre Righfada, or Cairbre, the long-armed, son of Conaire II., King of Ireland. Killed A.D. 220. The capital of Dalriada was Rath-muga, or Arthir-mugia, afterwards called Erthermoy, in the eastern plain, situated southwest of the mountain of Knocklaid, in the north of County Antrim, and now known as Armoy. From this locality, at the time of Cairbre Righfada, and for many years afterwards, bands of the Irish, or Scoti, as they were called, crossed over to Alba, now known as Scotland, until at length their numbers became so threatening that the Picts made strong efforts to expel them. They were, however, enabled to hold their ground until the commencement of the sixth century (A.D. 506), when Angus, Loarn, and Fergus, three of the twelve sons of Erc, a descendant of Cairbre Righfada, passed over to Albany from Antrim. Angus became master of Arran, Iona, Isla, and the adjoining isles. Loarn settled in the district now known as Argyle, while Fergus held the peninsula of Cantyre. After the death of Angus and Loarn, Fergus consolidated the Dalriadic colonies, and thus laid the foundation of the Kingdom of Scotland, which, in the reign of Kineth MacAlpin, A.D. 838, extended from Edinburgh to Caithness, and in the 12th century was still more extended, and took the name of Scotland, after the Scoti, or Irish colonists, from the territory of Dalriada. The district around the now quiet village of Armoy was therefore of very great importance at a very early date as the seat of the Dalriadic princes. The number of ancient remains still scattered over the locality bear evidence of its former importance. Here we have raths, cromlechs, and rude stone structures in every direction. One of the famous Round Towers stands in the parish churchyard. The original church was founded by St. Patrick himself, who received a grant of lands for its support, from Fergus Mor Mac Erok, immediately before that prince set forth on his celebrated expedition to Alba. St. Patrick ordained Olcan its first bishop.

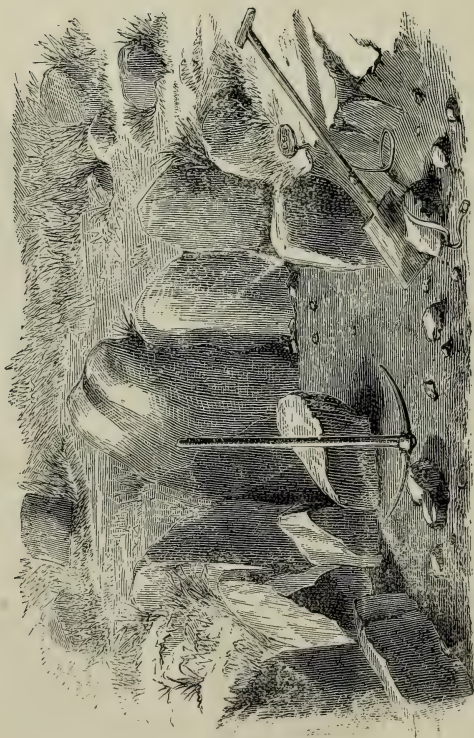
At a short distance to the south of Armoy, on the estate of Captain M'Cartney, in the townlands of Knocknahinch and Moyaver, remains of rude stone structures were known to exist for a very long time ; locally they are known as "coves," because of the cave-like character of the chambers there discovered. These "coves," or caves, occur particularly in one field in the Townland of Knocknahinch, and adjoin an old graveyard, now only used for the burial of unbaptised children. Indeed, this burial place seems to be a portion of the field or enclosure through which the caves run like a network of passages formed of rough walls at either side, a few feet apart, and covered over at a height of about five feet with rough flags, all of which are below the surface of the ground, and leave no indication of their form, direction, or extent on the surface. In a portion of the adjoining townland of Moyaver, at Carryhashel, large blocks of stone occur, scattered over a considerable extent of ground, and, though very rough, indicate an artificial enclosure. The exploring party selected this spot for their operations, and at once communicated with Captain M'Cartney, who afforded every facility, but unfortunately could not be present himself, as he desired. The sub-committee appointed by the Belfast Naturalists' Field Club to make the explorations were therefore left to contend against the prejudices of the people in the neighbourhood, who began to think the gentlemen from Belfast came to hunt for long-buried treasure, and lads, with others, calculating that something of value was to be found, began to dig and root about the place, and it was reported they found some stone celts, &c. The printed notice freely circulated through the National Schools, &c., by the Royal Irish Academy, calling upon the country people to collect all kinds of Irish antiquities, such as flint arrow-heads, celts, bronze implements, and gold ornaments found in bogs and around ancient monuments, is of very questionable utility, for it encourages an indiscriminate search for all kinds of things, without any regard to the con-

ditions under which they were found, and objects bartered from hand to hand find their way at last, through the ragman, to the Dublin Museum, with no reliable record as to where they came from, how they occurred, or what were the surrounding circumstances—the correct determination of which constitutes the real value of all such objects.

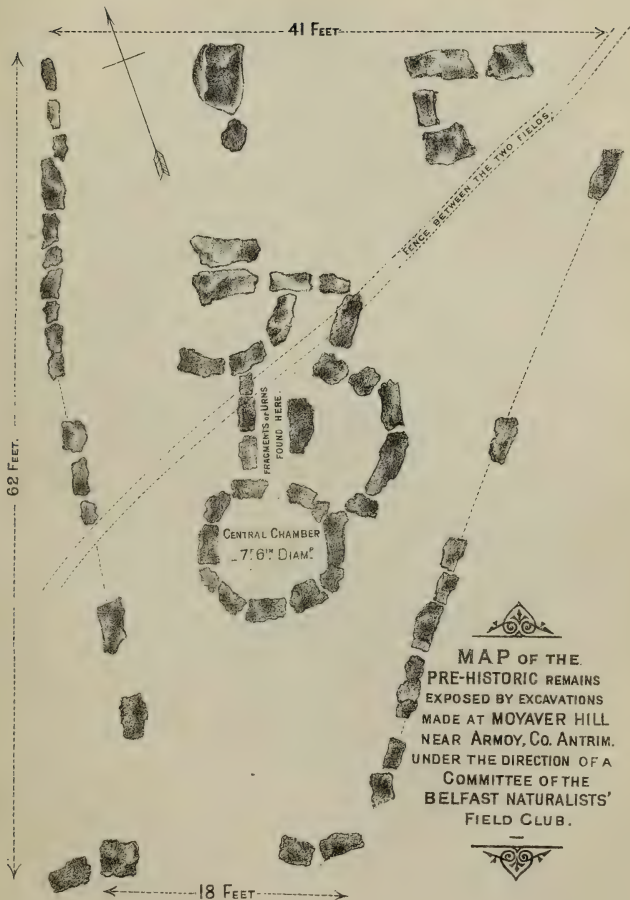
After employing a few men, a considerable portion of earth was cleared away, and the large stones were laid bare, so as to show that a large enclosure once existed on the spot, measuring about 60 feet from north to south, 40 feet wide at the northern end, and about 20 feet wide at the southern, as shown by the accompanying lithographed plan. Within the enclosure there was a group of irregular circular chambers, one almost perfectly circular (from a sketch of which the woodcut is taken) measured 7ft. 6in. in diameter; and three others, smaller and more irregular, all connected by a narrow passage about two feet wide. The enclosure itself, as well as the chambers, was formed by stones from two to four feet high, set on end; and the chambers appeared to have been at one time covered over with flat slabs of stone, some of which were built into the adjoining wall between two fields, and this wall ran diagonally across the explored enclosure. Persons in the neighbourhood remember having seen the central chamber covered. During the excavation, a large quantity of broken urns of various patterns were found; some were ornamented with the usual zig-zag indentations; a number of small flat stones and fragments were also found. The former were probably used to cover the mouths of the urns. All these objects were found scattered in the passages, and piled in small heaps, and otherwise under such circumstances as demonstrated that the place was completely rifled once, if not many times, before. It was a very common practice of the Danes before, and even after, their conversion to Christianity to plunder the caves, cairns, and burial places, as well as the

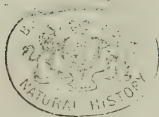


PLATE I.



CENTRAL CHAMBER, LOOKING SOUTH. FROM A SKETCH BY WILLIAM GRAY.





ecclesiastical centres, and to carry away everything of value they could lay their hands on; and hence many of our ancient monuments, when examined, show that the destroyer's hands have been already employed upon them. It was so in this case, and when the sub-committee excavated so far as to be able to define the general outline of the enclosure and its contained chambers, they had the earth returned, and impressed upon the people of the neighbourhood the propriety of leaving the surrounding stones as they then stood."

WILLIAM GRAY, *Hon. Sec.* .



NOTICE.

EXCHANGE OF PROCEEDINGS.

THE Committee of the Club have been desirous of establishing a yearly exchange of their published proceedings with those of kindred organisations in other places, and have during the past year forwarded copies of their Seventh Annual Report to other societies. They acknowledge with thanks the receipt of the following publications, and hope that other societies whose objects are similar will favour them with copies of their proceedings as published:—

Proceedings of the Bath Natural History and Antiquarian Field Club,	1870
Seventh Annual Report and Abstract of Proceedings of the Brighton and Sussex Natural History Society,	1870
Report and Transactions of the Cardiff Naturalists' Society, 1868-69,	1870
Moss Flora of Sussex (From the Brighton and Sussex Natural History Society,)	1870
Proceedings of the Bristol Naturalists' Society, Vol. V,	1870
Proceedings of the Natural History Society of Glasgow, Vol. I., parts 1 and 2,	1868-69
Abstract of the Proceedings of the Liverpool Geological Society, Eleventh Session,	1870
Transactions of the Norfolk and Norwich Naturalists' Society,	1870
Annual Report of the Board of Regents of the Smithsonian Institution for 1868,.....	Washington, U.S. 1870



ANNUAL CONVERSAZIONE.

THE ANNUAL CONVERSAZIONE was held on WEDNESDAY, 3d MAY.

(The following is Extracted from the Local Papers.)

THE Eighth Annual Conversazione in connexion with this club came off in the Museum, College Square. As usual at these reunions, there was a large and fashionable attendance, and this despite a bitterly cold and piercing wind, which blew in gusts and with a fury reminding us more of a night in November than in "the merry month of May." The Museum, as in former years, was lavishly decorated for the event with banners, evergreens, &c., by the sub-committee in charge of the Conversazione—namely, Messrs. Greer Malcolmson, Joseph Wright, Wm. Swanston, S. A. Stewart; with Wm. Gray and Hugh Robinson, secretaries of the club. In their labours, these gentlemen had the assistance and advice of Mr. Wm. Darragh, the curator of the Museum. As our readers are already aware, prominent amongst the articles exhibited at these meetings are specimens connected with the lectures delivered during the past session, and the various collections submitted in competition for the prizes offered by the Club. Amongst the latter, Mr. William Swanston carried off the prize for an assortment of *Irish Liassic fossils*, which are specially interesting on account of their containing several species not hitherto recorded as Irish. They consisted of seventy-six species, neatly arranged in four drawers, and many of them

were obtained on the club's excursion to Ballintoy. Miss Lester was awarded the prize for *Mosses*; Mr. Wm. Gray for Field Sketches; and Mr. Lockwood for some measured drawings of Bunnamaige Abbey, County Antrim. A special prize was awarded to Mr. Robert Smith for a water-colour drawing of Colin Glen. We may here state that Mr. Gray's sketches consisted of a collection of six of the principal Cromlechs in Down and Antrim, being a contribution to a complete set of drawings of these interesting structures in the two counties just named, and which will probably be hereafter published in the Club's Annual Report. All the above-mentioned pictures were exhibited around the walls, together with a set of works kindly lent by Mr. T. M. Lindsay, head-master of the Belfast Government School of Art. These embraced a series of coloured sketches in North Wales, and some books of large photographs, together with a number of beautiful paintings of flowers, shells, &c., executed by Mrs. Lindsay. The works of the fair artist received special attention during the evening. Dr. James Moore, M.R.I.A.—the energetic member of so many societies of this kind—was well represented by a series of water-colour drawings, all of which displayed his great powers as an artist. Whether depicting the rugged mountains of Mourne, the sandy beach of Dundrum and Newcastle, or the rich foliage of park scenery, the Doctor was alike successful. A number of miscellaneous sketches, taken in the South of France, were shown by Mr. Robert Young, C.E., while Mr. William H. Patterson exhibited a collection illustrative of Irish Archæology. On the tables throughout the room the microscopes of the members were located. Mr. Swanston had an interesting set of the *Echinodermata*—and microscopic preparations of them—illustrating a paper read by him during the winter session on that subject, and Mr. Wm. Gray exhibited a large assortment of specimens connected with his paper on “The Ammonite—its ancient and modern relatives.” These included

the ammonites, belemnites, and other fossil forms, together with the recent cuttle-fishes of our surrounding seas. At former *Conversazioni* the members had extensive displays of the flint instruments for which County Antrim in particular is so celebrated. It was not considered necessary to have any of these on exhibition this evening, but there was in the large room an almost equally interesting set of fabrications of these implements from the hands of the notorious "Flint Jack," of Yorkshire. Amongst them were some arrow heads, identical both in shape and chipping with those found in this country, and as an evidence of Jack's power of manipulation there were some formed of obsidian or volcanic glass, and one actually made from the bottom of a glass bottle. While this ingenious Yorkshireman has succeeded in duping many with these fictitious implements, he has succeeded in proving himself to be in possession of an art supposed to have been lost—namely, that of flint chipping. These articles were kindly forwarded by Mr. A. Wood, of Richmond, who on an adjoining table had a set of crinoids from the Mountain Limestone of Yorkshire. In Mr. Gray's collection of ammonites there was one which had been "improved" by "Flint Jack," who, in order to comply with the legend that they are petrified snakes, had skilfully carved the end of the fossil into the form of a snake's head. Mr. Wright, F.G.S., exhibited a collection of *Foraminifera* and other microscopic forms from the Lias of Ballintoy and the Estuarine Clay of Larne and Belfast Loughs. In addition to these, a great variety of microscopic objects were exhibited by the members, who were kept busy during the evening explaining the specimens to the visitors. Those shown by polarised light excited great interest. Mr. M. Fitzpatrick, who in the past session read a paper on "Newtownbreda and its Neighbourhood," showed sketches of Belvoir Park, Newtownbreda Church, &c.; Professor Everett, D.C.L., some thermometers of a new form, which have been used in the late deep-sea dredging expeditions, and which are now being ap-

plied for ascertaining the temperature in boring for mines ; Mr. W. J. Aston, a couple of beautifully-executed Japanese paintings ; Mr. John Browne, a variety of British army medals ; and Miss Carruthers, a large collection of bronze and silver medals. Several cases of British moths and butterflies were shown by Mr. Frederick Greer, who also exhibited, in their various stages, a number of silkworms which had been reared at Holywood. Throughout the room, ferns, belonging to Mr. Greer Malcomson, were placed, many of them having been obtained on the Club's excursions last Summer. With these were some foliage and flowering plants, kindly lent by Mr. A. Threlkeld. As in previous years, refreshments were supplied in the room which at present is devoted to the local collections. The entire arrangements were of the most complete kind, and were satisfactorily carried out under the superintendence of the energetic and painstaking honorary secretaries, Messrs. Wm. Gray and Hugh Robinson. Several new members were elected during the evening, as is the case at almost all the meetings of the Club.



BELFAST NATURALISTS' FIELD CLUB.

NINTH YEAR, 1871-72.

LIST OF OFFICERS AND MEMBERS.

President.

PROFESSOR JAMES THOMSON, LL.D., C.E.

Vice-President.

JOHN ANDERSON, F.G.S.

Treasurer.

GREER MALCOMSON.

Secretaries.

WILLIAM GRAY, HUGH ROBINSON.

Committee.

SAMUEL A. STEWART,

SAMUEL SYMINGTON,

WM. H. PATTERSON,

WM. H. PHILLIPS,

ROBERT YOUNG, C.E.,

WM. SWANSTON,

JOSEPH WRIGHT, F.G.S.,

J. H. STAPLES,

ROBERT SMITH,

HENRY KNIGHT.

M E M B E R S .

John B. Aicken, Dover street.
William Aicken, M.D., Murray's terrace.

Miss Alexander, Vicinage park.
W. J. C. Allen, J.P., Faunoran Greenisland.

Edward Allworthy, Mount-view.
John Anderson, F.G.S., Hillbrook, Holywood.

Robert Anderson, Ormeau road.
Mrs. Andrews, Chlorine place.
Edgar Arnold, Brunswick street.
E. N. Banks, Botanic avenue.
James M. Barkley, Jackson hall.
William Batt, Ormeau road.

J. G. Bell, Tullylish, Gilford.
H. B. Benson, Islandreagh, Dunadry.

J. M'D. Birmingham, A.R.I.A.I., Mount Charles.

Arthur Black, New road, Ballymacarret.

W. J. Boucher, Landscape terrace
W. H. Braddell, St. Ives, Malone park.

Charles H. Brett, Dunedin terrace.

John Browne, College park.

James Bryce, M.A., LL.D., F.G.S., F.R.G.S.I., Bowe's hill, Blantyre. (Hon. Mem.)

Henry Burden, M.D., Alfred st.

J. Campbell, Mossley, Carnmoney.

Miss Carruthers, Claremont street.

John Charley, College park.

J. C. Clarke, Cliftonville.

W. Clibborn, Windsor terrace.

Sir Edward Coey, Merville.

John Collins, Nottinghill, Malone.

Miss Connery, Victoria place.

W. J. Cooper, Upper Townsend street.

W. F. C. S. Corry, Mount Pottinger.

W. D. Cramp, Mount Charles.

Alexander Crawford, Fitzwilliam street.

William Crawford, jun., Fitzroy avenue.

W. C. Cunningham, Dante hall, Whiteabbey.

Edward Dale, Fitzroy terrace.

John H. Davies, Glenmore, Lisburn.

Robert Day, F.S.A., Patrick st. Cork.

George Donaldson, Mount Collyer.

Wm. Doubleday, College st. South.

Wm. Edgar, Lincoln avenue.

Miss Finlay, University square.

M. Fitzpatrick, Oberon, Ballynafeigh.

J. W. Forrester, Rose cottage, Balmoral.

T. M. H. Flynn, Joy street.

Wm. Gilmore, jun., Cliftonville.

H. M. Gilliland, Pakenham place.

J. T. Glover, Kew cottages, Mountpottinger.

James Gourlay, Killinchy, County Down.

Rev. J. Grainger, A.M., LL.D., Broughshane (Cor. Mem.)

Wm. Gray, A.R.I.A.I., Mount Charles.

Forster Green, Derryvolgie, Malone.

Henry Green, Derryvolgie, Malone.

Alex. Greenfield, Holywood.

Henry Greenhill, Wilmont terrace.

Mrs. Greenhill, Wilmont terrace.

Miss Greer, Tarbet villa, Sydenham.

James Greer, Annadale.
 Mrs. Greer, Annadale.
 W. H. Greer, College square East.
 William Gregg, Willow-bank.
 William Greig, Richmond.
 H. Hamilton, Great Victoria street.
 Wm. Hancock, Manor House,
 Lurgan.
 Dr. Hannay, Mount Charles.
 Mann Harbison, Newtownards.
 William Harvey, Kinnaird street.
 James Haslett, Franklin place.
 W. B. Haynes, Lincoln Villas,
 Knock.
 Miss Henderson, University sq.
 W. D. Henderson, University sq.
 A. F. Herdman, J.P., Howard
 street.
 Stephen Hicklin, Ligoniel.
 Professor Hodges, M.D., Windsor.
 J. Sinclair Holden, M.D., Larne.
 George Horner, Cliftonville.
 Miss Hunter, Donegall place.
 Alexander Hunter, Cromac street.
 Thomas Hunter, Holywood.
 A. R. Jacob, College street South.
 H. H. Jamieson, Casaeldono,
 Castlereagh.
 Miss Johnston, Dalriada, White-
 abbey.
 Miss Johnston, Glenavy.
 James Johnston, Alma Terrace.
 Samuel Johnston, Antrim Road.
 Wesley Johnston, Cherrymount.
 W.^x J. Johnston, Dunesk, Stran-
 millis.
 J. F. Johnston, Royal Botanic
 Gardens.
 R. S. Joyce, Mountpottinger.
 William Thompson Kelly, Regent
 street.
 Mrs. Keogh, Crumlin Road.

Dr. Keown, R.N., Dundela, Strand-
 town.
 William Kernahan, Great Patrick
 street.
 Rev. J. A. Kerr, A.B., Whiteabbey.
 Wm. King, Mountpleasant, Stran-
 millis.
 H. Knight, Springfield terrace.
 W. J. Knowles, Cullybackey.
 Miss Lamb, Divis View.
 W. W. Lamb, Divis View.
 George Langtry, Mount Charles.
 George D. Leathem, Thornlea,
 Malone.
 F. R. Lepper, Sydenham.
 Miss Lester, Lonsdale Street.
 T. M. Lindsay, Wilmont Terrace.
 Mrs. Lindsay, Wilmont Terrace.
 Ferdinand Lochrane, Landscape,
 Greenisland.
 F. W. Lockwood, Old Lodge road.
 John Love, Oldpark terrace.
 William Lowry, Kinkora, Syden-
 ham.
 Henry Major, Lisburn.
 Greer Malcomson, Shamrock
 lodge.
 James Malcomson, Mountpottin-
 ger.
 Mrs. Malcomson, Mountpottinger.
 John Marsh, Donegall street.
 Joseph C. Marsh, Donegall street.
 Rev. James Martin, Eglintoun, An-
 trim road.
 Mrs. Martin, Eglintoun, Antrim
 road.
 John Millar, Lisburn.
 Miss Millar, Lisburn.
 William Millar, Durham street.
 Miss Millen, Lansdowne terrace.
 James Moore, M.D., M.R.I.A.,
 H.R.H.A., Chichester street.

John Moore, M.D., Carlisle terrace.

George Molyneaux, Fitzroy avenue.

E. H. Molyneaux, Fitzroy avenue.

William Morris, Eton terrace.

Hugh Morrison, Ardoyne.

David Morrow, Clarence place.

Rev. W. E. Mulgan, A.B., Dunaghy Rectory, Clough, Co. Antrim.

H. J. Mulholland, Oldpark cottage.

Wm. Mullan, J.P., Willowvale.

J. J. Murphy, F.G.S., Oldforge, Dunmurry.

J. W. Murphy, Stranmillis.

J. R. Musgrave, J.P., Drumglass, Malone.

Robert M'Adam, College square East.

James M'Clenahan, Ardoyne.

Miss M'Clure, Belmont.

Thomas M'Clure, J.P., D.L., M.P., Belmont.

Rev. Edmund M'Clure, Ulsterville.

John M'Connell, Eglinton street.

Rev. William MacIlwaine, D.D., Ulsterville.

Mrs. MacIlwaine, Ulsterville.

Archd. MacIndoe, Donegall pass.

Daniel M'Kee, Adela place.

Robert M'Kee, Adela place.

John MacKenzie, C.E., Balmoral.

R. L. M'Kinney, Fleet street.

Thomas Macknight, Balmoral terrace.

Thomas M'Millen, York st.

William M'Millen. Westport, Co Mayo.

George O'Brien, Botanic avenue.

Thomas O'Brien, Hollywood.

David C. Patterson, Hollywood.

Robert Patterson, J.P., F.R.S., College square North.

William H. Patterson, Dundela, Strandtown.

W. B. Pearsall, Upper Merriion st., Dublin.

James Phillips, Virginia street.

W. H. Phillips, Holywood.

John Pim, Clifton park avenue.

Joshua Pim, Crumlin terrace.

Thomas W. Pim, Evelyn lodge, Sydenham.

John Preston, jun., T.C.D., Dunmore.

John Pyper, Oldpark terrace.

Thomas Plimmer, Virginia street.

John Reid, Donegall square West.

Francis Ritchie, The Grove.

Miss Robinson, Lisanore, Antrim road.

Rev. George Robinson, Tartaraghan, Co. Armagh.

Hugh Robinson, Donegall street.

Ninian J. Robinson, Donegall st.

W. A. Robinson, Crofton, Holywood.

Edward Rogan, May street.

Richard Ross, M.D., Wellington place.

Rev. C. Scott, A.M., Grovefield Woodstock road.

Wm. M. Scott, Eglinton terrace.

Mrs. Scott, Victoria terrace.

R. C. Sedgwick, Holywood.

John Shelly, Whiteabbey.

Thomas Shepherd, Springfield terrace.

William Shepherd, Holywood.

Thomas Shaw, Pakenham place.

Daniel Sheriff, Larne.

W. S. Simpson, Upper Crescent.

George K. Smith, Whiteabbey.

Robert Smith, Hughes's buildings.
 Thomas Smyth, Kensington st.
 Rev. George Smythe, A.M., Carn-
 money.
 Adam Speers, Holywood.
 J. H. Staples, Holywood.
 Robert Stewart, M.D., Falls road.
 S. A. Stewart, North street.
 Miss Swanston, University street.
 Samuel Symington, Brookfield
 house.
 Ralph Tate, A.L.S., F.G.S. &c.,
 Pierremont terrace, Darling-
 ton (Hon. Mem.)
 A. O'D. Taylor, Marino, Holy-
 wood.
 Wyville Thomson, LL.D., F.R.S.,
 F.G.S. &c., University, Edin-
 burgh.
 Professor James Thomson, A.M.,
 LL.D., C.E., University sq.
 Mrs. Thomson, University square.
 Miss Thomson, University square.
 George Thomson, Springfield
 buildings.
 Henry Thompson, Windsor.
 Dr. W. G. W. Thompson, Bally-
 money.
 Miss Thorn, Millbank, Holywood.
 Alexander Threlkeld, Botanic
 road.
 Miss I. M. S. Tod, College park.
 Charles Todd, Markethill, County
 Armagh.

W. A. Todd, Regent Street.
 Robert K. Tomlin, University sq.
 Wm. Valentine, J.P., Glenavna
 Whiteabbey.
 James W. Valentine, Fortwilliam
 park,
 T. R. Walkington, Laurel lodge,
 Sydenham.
 John S. Ward, Lisburn.
 W. R. Ward, Nea House, Christ-
 church, Hants.
 Lieut.-Col. Warrand, R.E., Fort-
 william park.
 Alex. C. Welsh, Dromore, County
 Down (Cor. Mem.)
 T. K. Wheeler, M.D., Clarendon
 place.
 T. K. Wheeler, jun., Clarendon
 place.
 David Wilson, Ballymoney.
 Miss Wilson, Ballymoney.
 John Workman, Windsor,
 Rev. Robert Workman, A.M.,
 Ceara, Windsor.
 Thomas Workman, Ceara, Wind-
 sor.
 Edward Wren, Donegall pass.
 Joseph Wright, F.G.S., F.R.G.S.I.,
 Kinnaird street.
 James Wright, Fitzroy avenue.
 H. J. Wright, Lonsdale terrace.
 Robert Young, C.E., Richmond.
 Robert Young, jun., Richmond.
 Samuel Young, Roselands.

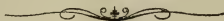
*Any Changes in the Addresses of Members should be communicated by
 them to the Secretaries.*



RULES

OF THE

Belfast Naturalists' Field Club.



I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the objects of the Society be the practical study of Natural Science and Archæology.

III.

That the Club shall consist of Honorary, Corresponding, and Ordinary Members. The Ordinary Members to pay annually a subscription of Five Shillings ; and that Corresponding Members be expected to communicate a paper within every two years.

IV.

That Candidates shall be proposed and seconded at any meeting of the Club by Members present, and be then elected by a majority of the votes.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, two Secretaries, and ten Members, who form the Committee. Five to form a Quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the [most interesting localities, for investigating the Natural History and Archæology of the district. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collections of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable; provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

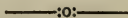
That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.



The following Rules for the conducting of the Excursions have been arranged by the Committee.



I. The Excursion to be open to all members ; each one to have the privilege of introducing two friends.

II. A Chairman to be elected as at ordinary meetings.

III. One of the Secretaries to act as conductor, or in the absence of both, a member to be elected for that purpose.

IV. No change to be made in the programme, or extra expenses incurred, except by the consent of the majority of the members present.

V. No fees, gratuities, or other expenses to be paid except through the conductor.

V. Every member or visitor to have the accommodation assigned by the conductor. Where accommodation is limited, consideration will be given to priority of application.

VII. Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII. Those who attend an excursion without previous notice will be liable to extra charge, if extra cost be incurred thereby.

IX. No intoxicating liquors to be provided at the expense of the Club.



BELFAST NATURALISTS' FIELD CLUB.

NINTH YEAR.

THE Committee offer the following Prizes, to be competed for during the Session ending March 31, 1872:—

I.	For the best Herbarium of Flowering Plants,	£1	0	0	
II.	For the Second Best	do.	0	10	0
III.	„ Best Collection of Mosses,	.....	0	10	0
IV.	„ Best do. Seaweeds,	.....	0	10	0
V.	„ Best do. Ferns,	.....	0	5	0
VI.	Best Collection of Cretaceous Fossils,	.....	0	10	0
VII.	Do. Liassic do.,	.....	0	10	0
VIII.	Do. Palæozoic do.,	.....	0	10	0
IX.	Do. Marine Shells,	.....	0	10	0
X.	Do. Land and Fresh Water Shells,	.....	0	10	0
XI.	Do. Coleoptera,	.....	0	10	0
XII.	Do. Lepidoptera,	.....	0	10	0
XIII.	Best Set of 25 Microscopic Slides,	.....	0	10	0
XIV.	Best Collection Archæological Objects,	.....	0	10	0
XV.	Do. Crustacea,	.....	0	10	0
XVI.	Do. Echinodermata,	.....	0	10	0
XVII.	Six best Field Sketches appertaining to Geology, Archæology, or Natural History,	.....	0	10	0

SPECIAL PRIZES.

- XVIII. Mr. Plimmer offers a Prize of 10s. 6d. for the Best Collection of any or all the above, collected AT THE EXCURSIONS or Field Meetings of the year.

XIX. Mr. John Anderson, F.G.S., offers a Prize of £1 1s. for the Best Original Measured Drawing and details of some ruined building in the Province of Ulster, of not later date than the 15th century. The building selected to be different from that for which the Prize was given last year. The Prize Drawings to become the property of the Club.

XX. Professor James Thomson, LL.D., offers a Prize of £1 1s. for the Best Essay and Oral Answering on the Optics of the Microscope. In event of there being not less than three competitors of sufficient merit, a Second Prize of 10s. 6d. will also be given. Details of the conditions under which this Prize is offered will be found in the Report for 1869-70.

XXI. Mr. J. W. Murphy offers a Prize of 10s for the Best Collection of Recent Sponges.

CONDITIONS.

No Competitor to obtain more than One Prize in any one year.

No Competitor to be awarded the same Prize twice within five years.

All Collections to be made personally during the Session, within the Province of Ulster. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in flower, and classified according to the natural system. The Sketches and Drawings to be the Competitors' own work. The Essays to be given in to the Secretaries on or before 17th March, 1872.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful Competitors.

Further information regarding these conditions may be had from the Secretaries.

Presented
11. FEB. 86



Presented.

11 FEB 1886



Ninth Annual Report

OF

THE BELFAST

NATURALISTS' FIELD CLUB,

1871-72.



NINTH ANNUAL REPORT

OF THE

Belfast Naturalists' Field Club,

WITH

STATEMENT OF ACCOUNTS,

AND

A LIST OF THE OFFICE-BEARERS AND MEMBERS,

FOR THE

YEAR ENDING 31ST MARCH, 1872.



BELFAST:

PRINTED AT NEWS-LETTER BOOK-PRINTING HOUSE,
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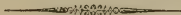
1872.



R E P O R T

OF THE

Belfast Naturalists' Field Club.



THE COMMITTEE, at the close of the ninth year, have the satisfaction of being able to report that the objects and aims of the Club have been promoted during the past year with uniform success.

Notwithstanding the very unfavourable state of the weather during the past summer, the programme of excursions was fully carried out, and the following places were visited :—

20th May,	Greyabbey and Mountstewart.
13th & 14th June,	Newcastle, the Coast of Co. Down, and Rostrevor.
8th July,	Cave Hill.
29th July,	Broughshane, Skerry, and Valley of the Braid.
22nd to 26th August,	South Donegal, from Donegal by the Coast to Glenties, &c.
9th Sept.	Woodburn River and Belfast Water-Works.

During the summer, the Committee arranged short excursions for the convenience of those Members who could not attend those requiring longer time; and they hoped that, at those short or afternoon excursions, there would have been a very numerous

attendance. In this the Committee were disappointed, for the longer excursions generally commanded the best attendance; and the Committee regret that the Club's funds sustained considerable loss whenever the actual attendance fell short of what was reasonably expected and prepared for. Separate accounts of the excursions are appended.

Prior to opening the Winter Session, the Council of the Natural History and Philosophical Society expressed a desire to discontinue the holding of joint meetings, as arranged the previous year. Your Committee at once fell in with the suggestion, and an arrangement was made by which each Society, by holding separate meetings, should better preserve its individuality without disturbing those friendly relations that happily exist between the two Societies, and which it is desirable to maintain for the advantage of each.

Under the new arrangement, six meetings of the Club were held, at which the following papers were read:—

1871.

Nov. 22nd.—“An Inquiry into the possibility and probability of the Occurrence of Coal in the Neighbourhood of Belfast,” by Mr. William Gray.

Dec. 13th.—“The Geology of Cultra, Co. Down,” by Mr. Joseph Wright, F.G.S.; and “A Day with the Oyster Dredgers,” by Mr. S. A. Stewart.

1872.

Jan. 10th.—“The Stone Period and Race,” by Rev. Wm. M'Ilwaine, D.D.

Feb. 7th.—“Remarks on Cometary Bodies,” by Mr. Martin M. M'Minn; and “Giants' Graves,” by Mr. J. S. Holden, M.D., F.G.S.

March 6th.—A Microscopic Exhibition was held.

April 10th.—“The Round Towers, and Early Irish Churches,” by Mr. F. W. Lockwood.

Abstracts of the Papers read are appended.

At all these meetings the attendance was more than the average of past years.

Nothing of special interest has been added to the Club's Sketch Book during the year; but it continues open for the reception of such Drawings, Sketches, Measurements, or Photographs as may help to illustrate the Archæology of the district, or any other department of the Club's investigations.

Your Committee regret that the competition for the Prizes offered by the Club has been so limited this year. The following gentlemen kindly acted as Judges in awarding Prizes to the best of the Collections submitted for competition :—

MR. THOMAS M. LINDSAY,

Head Master of the Belfast Government School of Art ;

MR. ROBERT YOUNG, C.E.,

DR. JAMES MOORE, M.R.I.A., H.R.H.A., &c.,

MR. S. A. STEWART,

MR. ROBERT SMITH,

And awarded Prizes to the following Members :—

For the best Herbarium of Flowering Plants, MR. HUGH ROBINSON.

For the Six best Field Sketches, MR. F. W. LOCKWOOD.

Mr. Anderson's Prize for the best Measured

Drawing,

MR. R. M. YOUNG.

Mr. Robinson's Collection included 312 species ; Mr. Lockwood's Sketches were of geological sections in the neighbourhood ; and Mr. Young selected Newtownards old Church as his subject.

In addition to the formal business of the Club at the Summer Excursions and Winter Meetings, several of the members continue to work in the promotion of their own favourite subjects. Mr. Wright has, during the past year, made some additions to the list of Liassic Foraminifera published last year ; and, in conjunction with Mr. Stewart, has opened up a new field of investigation in the Cretaceous Rocks, and already some 40 species of Foraminifera, Entomostraca, and Sponge Spiculæ, have been found in the Chalk and Flints of County Antrim. The Members in charge of the local collection in the Museum have continued their labours, and during the past year were chiefly employed in re-arranging the Herbarium.

Your Committee deeply deplore the loss the Club has sustained during the past year by the lamented death of Mr. Robert Patterson, F.R.S., who was widely and honorably known in the

world of science. He was one of the first members of the Club, and always manifested the greatest interest in its welfare ; and his valuable experience, kindly co-operation, and generous encouragement, tended in no small degree to win for your Society that measure of success it at present enjoys.

The Committee have been in communication with several other Societies having kindred objects, and during the past year exchanged the Club's Reports for the published transactions of those societies.

WILLIAM GRAY,	} <i>Hon. Secs.</i>
HUGH ROBINSON,	



Dr.

Belfast Naturalists' Field Club in Account with Treasurer.

Cr.

To Balance from 1870-71	...	...	£43	12	4	By Expenses of Conversazione	...	...	£11	3	4
" Subscriptions	...	...	50	0	0	" Printing Annual Report	...	...	15	9	1
" Arrears of Subscriptions	...	...	0	10	0	" Expense of Woodcut for Report	...	...	2	0	3
" Conversazione Tickets sold	...	...	6	2	0	" Advertising and Printing	...	...	7	17	11
						" Stationery, &c.	...	...	5	11	10
						" Prizes	...	...	1	10	0
						" Postages	...	...	2	19	8
						" Delivery of Circulars	...	...	1	10	0
						" Loss on Excursions	...	...	1	17	4
						" Freight and Charges on Microscopic Objects	...	...	1	2	11
						" Rent of Museum	...	...	5	0	0
						" Curator	...	...	3	0	0
						" Balance on Hand	...	...	41	2	0
									£100	4	4

Audited and found correct,

HUGH ROBINSON, Hon. Secretary.

GREER MALCOMSON, Treasurer.



SUMMER SESSION.

The following Excursions were made during the Summer Session :

On Saturday, 20th May, to

MOUNTSTEWART AND GREYABBEY.

A large party met at the Ulster Hall, and left there in two large open vehicles. There was no interruption to the direct drive from Belfast to Newtownards, except the occasional halt called for the purpose of examining the ferns by the wayside glens, or the exposed rocks on the adjoining banks, or to gather some special plants that were here and there recognised on the hedge-rows. Driving through the populous town of Newtownards, a visit was paid to the ruins of what was once the parish church,* built by Sir Hugh Montgomery, and which subsequently became the session house. It is now a "neat ruin," well cared for by the representatives of the Marquis of Londonderry. On the road thence to Mountstewart, not the least interesting incident was a morning call paid the "oldest inhabitant" of the County Down. This old gentleman is 103 years of age, and still well and hearty. He was a little puzzled to account for such a number of visitors as filled his cottage, and expressed his regret that "he had nae seats for all of you." Standing up he flourished a stick, and showed

* See Measured Drawings by Mr. R. M. Young in the Club's Portfolio.

how he could shoulder a musket in olden times. By the courtesy of J. Brownlow, Esq., the party were permitted to go where they liked through Mountstewart Demesne. Almost at the very entrance a curious forked variety of the adder's tongue fern was found, that was unknown to any of the members present, not having been seen at any previous excursion. The grounds of Mountstewart looked really very beautiful, as, indeed, they always do, under the care of Mr. Grieve, the head gardener, who kindly conducted the party through, and pointed out the several objects of interest. In the garden a large vine was pointed out as being next in size to the very celebrated one of Hampton Court. The Mountstewart vine was planted in 1769, and in 1800 the year's crop of grapes weighed 1,112 pounds; it is still in good health and production, and it covers a space forty feet long, and twenty feet wide. Mr. Grieve conducted the party through the plantation, and pointed out some fir trees covered with aphides, or plant lice, and explained that for years these creatures were very destructive to the trees over a very large portion of the demesne. Several of the members secured specimens for closer microscopic examination at home. The party were next shown through the mansion, which contains several objects of interest to the naturalist and archæologist. Some antique bronzes were much admired, as well as the very fine examples of Irish elk horns that are appropriately mounted in the hall.

Leaving Mountstewart, the entire party drove off to the beautiful grounds of Greyabbey, but more interesting in consequence of the historical reminiscences that crowd around the spot, where carved slabs and sculptured effigies direct the mind backwards to the days of Runnymede. The Abbey was founded in 1193 by the wife of Sir John de Courcy, and daughter of Godred, King of the Isle of Man.

The effigies of De Courcy and his wife may be seen in one of the side chapels of the Abbey. The party then left to explore the grounds, and, as is usual on these occasions, the native plants of the district visited were carefully investigated. Some disappointment was felt at not finding the Irish Furze (*Ulex strictus*). Mountstewart

is the station mentioned in the books for this peculiar form of the whin, and accordingly those who came provided with *vascula* looked forward to filling them with good specimens of at least one rare plant. However, no *Ulex strictus* could be found, and, on inquiry, those interested in the plant were informed that it does not now exist at Mountstewart. It has been stated that the Irish Furze is only an inconstant form of the common whin, and that view is strongly supported if it has really disappeared from its original *habitat* in so short a time. Though the search for the plant above-mentioned proved fruitless, yet the botanists were not unsuccessful. Near to Dundonald was found the Lamb's Lettuce (*Valerianella carinata*), a plant not hitherto put on record as Irish. It occurs in abundance on hedge banks for about a mile of an old bye-road. How long it may have existed here cannot be known, but it is at all events, quite wild and well established at present. *Fumaria pallidiflora*, one of the smokeworts, was found at Mountstewart, and the Bistort (*Polygonum Bistorta*) at Greyabbey. A number of other plants, which it is unnecessary to enumerate, were also collected during the day.

13th and 14th June,

NEWCASTLE AND COAST OF DOWN.

Owing to the severity of the weather, only a small party met at the County Down Railway, and started for Newcastle, where they were met by W. A. Traill, Esq., and W. E. L'E. Duffin, Esq., of the Geological Survey, who very kindly accompanied the party along the coast, and pointed out some of the most remarkable geological features, including a number of porphyritic dykes traversing the primary rocks of the district.

At Kilkeel, a visit was paid the very fine Cromlech that occurs quite near the town, also the old Church from which the town takes its name.

Excellent accommodation was provided for the night at the Kilmorey Hotel, and early next morning the party explored the Giant's Grave, near the Roman Catholic Church, within about a mile of the town. After breakfast, they drove on to Greencastle, examining the carboniferous rocks on the shore ; here good examples of trap dykes were found traversing the limestone. At Greencastle there are the ruins of a very fine old castle—one of the first built by the English, and one that did good service during the terrible wars between the English of the Pale and the native Irish. At a short distance there is a good example of the old Irish Dun or Fort.

Between Greencastle and Rostrevor, about a mile on the mountain side of the main road, and near the river known as the Causeway Water, there is a very fine Cromlech, the covering stone probably weighing not less than 42 tons. This is placed on the ends of standing stones, and a chamber is formed below. Nearer Rostrevor, there is another Giant's Grave, but, being closer to the public road, it is very much injured. Time would not allow a visit to Cloughmore, or Kilbroney Church ; the party had reluctantly to hurry on to catch the last train for Belfast at Warrenpoint, which they did with the hope that this trip would be included in the programme for another year.

On Saturday, 8th July,

CAVE HILL QUARRIES AND DEER PARK.

Noon, which was the appointed hour of departure, was ushered in by a deluge of rain, accompanied by flashes of lightning, that shook the nerves of many who had intended accompanying the party, and reduced it to a comparatively small number. However, during the nine years of the Club's existence, not a single excursion has been postponed on account of bad weather, the rule being to carry out the programme, with whatever number may present themselves ; the weather did not, therefore, on this occasion prevent the party enjoying a pleasant and profitable day ; those who

attended were not fair-weather naturalists, but such as felt themselves gifted with *stamina* sufficient to brave a bad day on the mountain, and who were also endowed with an amount of enthusiasm that enabled them to snatch enjoyment even from adverse circumstances. The Cave Hill is well known as a good locality for naturalists—a number of rare plants occur on it, and the cabinets of local geologists have from time to time been enriched by the fossils found in the limestone quarries. Some of the specimens found by members of the Field Club at these quarries are unique, not having as yet been found elsewhere. Only a few fossils were secured on this occasion, the stone which is at present worked being only slightly fossiliferous. The sections exposed here are, however, very instructive, ranging through Lias, Greensand, and Chalk, with the usual capping of Basalt, which also bursts through the sedimentary rocks in the form of dykes. On the *debris* of the quarries two rare plants were found, viz., the Gromwell (*Lithospermum officinale*), and the Red Broom Rape (*Orobancha rubra*). The latter occurs only as a parasite on the roots of the Wild Thyme (*Thymus Serpyllum*). Those present had a good opportunity of verifying the fact, as the plants were easily dug out of the loose *debris*, and the connection observed. It seemed strange that the slender thread-like roots of the Wild Thyme should be able to afford nourishment not only to their own proper plant but also to such a gross succulent parasite as the Broom Rape. In the Deer Park, not far from the quarries, is the only Irish *habitat* for the Musk Moschatel (*Adoxa Moschatellina*). It grows here in small quantity, and completely hidden under large blocks of stone. It has been known in this station for forty years at least, and is evidently quite wild, there not being a trace of any introduced plants in the Park, save the trees so recently planted. It had been announced that at this excursion the *habitat* of a rare fern would be indicated, and a special prize was offered by one of the members for the first specimen discovered, one of the conditions being that none of the plants were to be removed. Accordingly, on leaving the quarries, the party were taken higher up the hill, and the field was pointed out in which the Moonwort

(*Botrychium Lunaria*) grows very sparingly. Seemann's figure of the plant was shown to all present, and seven members engaged in the competition. This rare little fern only grows to a height of 2 to 4 inches, and is usually hidden by the grass and other larger plants; consequently, the contest was a pretty severe test of keenness of sight and powers of observation. In a short time the rain commenced again to pour down in torrents, accompanied with thunder and lightning, so that the search had to be continued under shelter of umbrellas. Ultimately, Mr. F. A. Lockwood was declared the winner, and the prize (Seemann's "British Ferns at One View") was handed to him by the Chairman of the day, Rev. George Robinson, A.M. The Adder's Tongue Fern was plentiful in the same field, and also the Yellow Oat Grass (*Trisetum flavescens*). Specimens were also collected here of the Frog Orchis (*Habenaria viridis*), and of the greater Butterfly Orchis (*Habenaria chlorantha*). The party now pursued their course to the summit of the mountain, visiting the well-known M'Art's Fort and the caves. A rare species of Hawkweed (*Hieracium anglicum*) was found plentifully on the cliffs, as also the Red Broom Rape, already noticed. The filmy Fern (*Hymenophyllum*) is said to have been found on this part of the hill, but time did not allow of any search for it. Notwithstanding the very severe character of the day, the rain cleared off in the evening, and afforded the party an opportunity of enjoying the magnificent view from the summit of the hill. On leaving the caves, they proceeded to the Deer Park, and, after an examination of the exterior of Belfast Castle, which has been built for the Marquis of Donegal, and which is now rapidly approaching completion, they were courteously shown through the interior by Mr. Finnie, the clerk of works in charge. This concluded the day's programme, and the party returned to town fully satisfied with the results of the excursion, and fully compensated by them for any inconvenience caused by unfavourable weather.

On Saturday, 29th July, to

BROUGHSHANE, SKERRY, AND SLEMISH.

This excursion promised a most interesting day's work in the valley of the Braid, but the day selected for the trip was particularly unfortunate as to weather. A regular downpour occurred at the hour of meeting at the Northern Counties Railway. Hopelessly wet as the day was, the conductor and a small party left by the 9.30 train for Ballymena, determined to maintain the club's professed independence of weather. Other members joined at Ballymena, including a lady who had travelled some miles to attend the day's field meeting. The rain continued to fall, but did not prevent the party driving off to Broughshane. Here the worthy rector and some friends joined, and thus augmented, the party moved off for the valley of the Braid, being the borderland of the ancient territory of Dahiada, and adjoining the Northern boundary of Dalaradia, which extended from Sliabh-mis, now Slemish, to Newry. It was intended to ascend Slemish, and explore its geological structure, said to be the most recent of the Irish trap rocks, but the continued rain prevented the accomplishment of this part of the programme, and a visit was paid to Skerry Church, the ruins of which are perched on a boss of trap rock rising abruptly from the surrounding slopes. Tradition, supported by a document of the sixth century, attributes the erection of this church to Saint Patrick. Skerry was long famed for its pilgrimages, and the healing virtues of Tubbernacool Holy Well. Several of the great O'Neills are buried around its mouldering walls ; but no monumental slab records the fact ; all is desolation and ruin ; the weather-beaten graves of the hamlet's "rude forefathers" now expose their bones to the bleaching effects of sun and rain. From Skerry, the party drove to the townland of Ticloy, so called from the cromlech, or "stone house," occurring there, in very good condition—indeed, there are two on the same field, the second not quite perfect. Flint arrow-heads and other objects of antiquarian interest have been found from time to time in this locality ; and the wealth of a local farmer is, in the opinion of his neighbours, owing to the rich finds of silver

articles around Ticloy cromlech. The members of the Field Club, during the examination of the field, have found what are called "thumb flints," arrow heads, and flakes. On returning from Ticloy, one of the party pointed out an extremely rude stone cheese-press, very primitive in its construction, and yet it appears answered its purpose well. The geologists of the party had very good opportunities of examining the decomposing trap rocks, showing what some suppose to be a concretionary nodular structure, while others affirm that it is due simply to decomposition. This is a point of great importance in determining the nature and origin of the Giant's Causeway. The section along the road from Broughshane to Carnlough exhibits very good examples of glacial action. The surface of the hard greenstone rocks is scored and polished in one direction, similar to what has been reported at Castle Espie and elsewhere. The limited time afforded for botanizing, combined with saturated fields and atmospheric humidity, did not promise much for results in this department. Nevertheless, several rare plants were obtained. Perhaps the best find of the day was Sabine's Rose (*Rosa Sabini*), which is accounted among the rarer forms of the wild rose in this country. At Ticloy, there was found in some plenty the bristly wild oat (*Avena strigosa*), by no means a common plant. The field gentian (*Gentiana campestris*) was found sparingly at Skerry, and in the valley below the elecampane (*Inula Helenium*). Several plants of less note were observed; but these are the best of the hurried examination under the heavy rain, which was at length joyfully abandoned to accept the hospitality offered by the rector of the parish, Rev. Dr. Grainger, which made up for the impediments of the day, and better prepared the party for their return homewards.

On Tuesday, 22nd Aug., to Saturday, 26th Aug.

SOUTH DONEGAL.

The promoters of the Irish North-Western and other railways have at length determined to open up the way for tourists and others to visit the wild scenery of Donegal, and circular tours have

been planned, by which excursionists can with ease and comfort visit some of the grandest coast and mountain scenery of Ireland, and explore mountain passes, cliffs, glens, and mountains unsurpassed in Britain for their variety, extent, or historical associations.

Quite independent of the arrangements here referred to, the Belfast Naturalists' Field Club for some time contemplated a visit to Donegal, and this year "South Donegal" was set down in the programme of excursions. Arrangements having been accordingly made for an expedition to occupy five days, the conductor, with a party of fifteen members and friends, including several ladies, set out on Tuesday, the 22nd, for Stranorlar, by the train leaving the Ulster Railway Station at seven o'clock in the morning. The perusal of the morning papers helped to fill up the time as the train hurried through the scenes already visited by the Club, from the valley of the Lagan to the Silurian district of Pomeroy. Soon after fresh interest was excited in passing Omagh and Newtownstewart, made famous by recent events. At Strabane a change was made from the Irish North-Western to the Finn Valley Railway, and about an hour's run on this line brought us to Stranorlar. Bag and baggage, picks, hammers, and collecting boxes were here transferred to the vans that awaited our arrival ; indeed, a whole crowd clamoured for the honour of our patronage, and, although the conductor had made his bargain beforehand, he had some difficulty in determining with whom he was to go ; fortunately, he selected the right man, and had no reason to regret having entrusted the party to the care of Mr. M'Gerty, who "carried out the programme" to the letter. He was well acquainted with the whole locality, and gave the name of every peak as they unfolded themselves among the hills, the origin of the names, and the legendary lore, but was completely "bothered" with our questions about mica-schist, lepidoptera, or polypodies ; and professing to know something of geometry, we asked him if ever he got over the "ass's bridge." He said, "No ; but I drove a pair of bays over Connolly's bridge."

Passing up the valley of Burn Darnett, affording extensive views of highland scenery, a flagstaff to the left indicated Meenglass, the seat of Viscount Lifford. Further on, Lough Mourne comes in

view, and then an old castle on the high ground to the right, and a few miles further the chief feature on the road—the famous Barnsmore Gap—a deep pass or cut through the mountains, extending a few miles, through which the road runs, and is lined at either side by high cliffs, and sloping rock terraces, rising hundreds of feet high, and forming a magnificent picture, requiring only a little more foliage to perfect. We here first noticed the *Osmunda* or royal fern, and collected several specimens of granite and other rocks.

Farther on the road towards Donegal, the character of the scenery changes. The wild moor passes into a beautiful undulating, well-wooded country, and Lough Esk appears to the right, with Esk Castle towering above the foliage that clothes the southern boundary of the lake, and the demesne of Ardnamona adding to the beauty of its northern limit. Soon after passing along the valley of the Esk the old town of Donegal comes into view, and a quick drive over falling ground brings us, with a cheer, to the comfortable hostelry of Dillon's Hotel, and in ten minutes after our arrival we were all seated at a substantial dinner, served up with due regard to our requirements after a railway run of 100 miles, and a further drive of seventeen miles by car.

After dinner a visit was paid to Donegal Castle, built by Sir Basil Brook, in the reign of Elizabeth, on the site of the castle of the O'Donnells, chiefs of the territory of Tir Conaill, the country of Connell, from Conall Gulban, who, in the fifth century, held a territory embracing nearly the whole of the present County Donegal. This territory of Tir Conaill was formed into the present county by Lord Deputy Perrott, in 1585, who called it Donegal from the town of that name—Dun-na-M'Gall—or the fort of the foreigner, so called from the fort erected there by the Danes.

After leaving the Castle we visited the remains of the old Abbey, beautifully situated on the margin of the bay, but in a most melancholy state of dilapidation. The original Abbey was founded in 1474, by Hugh Roe O'Donnell, as recorded in the annals of the Four Masters, one of the most valuable compilations connected with Irish history. It was written in this abbey by Michael O'Clery and three other writers, between the year 1632 and 1636,

and refers to events in the nation's history extending over a space of 4,500 years, from the year of the world 2242 up to A.D. 1616. Donegal Abbey was burnt, in 1601, during a contest between two members of the O'Donnell clan. Niall Gary O'Donnell joined the English and took the Abbey, and it was attacked by Hugh Roe O'Donnell. The monks were scattered, and the building so damaged by fire that the monastery never recovered. The old Abbey is now daily going to decay, and in the absence of that generous appreciation of our national monuments, and the want of means by which to resist the dilapidations of time, it is probable that at length the lot of these venerable old ruins will be that of the pauper with broken fortune and declining health, and they will literally be handed over to the tender mercies of the guardians of the poor! Shades of O'Clery—alas, for our vaunted intelligence, our national pride, and our public spirit.

Returning from the crumbling ruins of Donegal Abbey, we again mounted our vehicles for a seventeen miles' drive to Killybegs, and all along the route we had some extensive views of the coast of Donegal to Sligo. From the high mound over the village of Mount Charles the view was particularly beautiful, with a clear atmosphere and setting sun; the coast line was well marked from Donegal to Ballyshannon and Bundoran, and from Lough Erne to the mountains of Sligo. As the evening closed, the coast road—reminding us very much of the road from Cushendun to Fair Head—was rapidly passed over without even stopping to visit the Relig at Bruckless, so well described by a member of the club, Mr. W. H. Patterson, in a paper published in the transactions of the Royal Historical and Archæological Society of Ireland. Arriving at Coane's Hotel, Killybegs, at about nine p.m., we found a number of ladies and gentlemen awaiting us, including Rev. J. Stephens, P.P.; Mrs. Barrett, of Bruckless; Mr. and Mrs. M'Dermott, &c., &c., all of whom were anxious to further the object of our visit. Tea was quickly served up, and a most agreeable evening was spent conversing upon the archæological, geological, and botanical peculiarities of the locality.

Notwithstanding the early morning's rain, some of the party

visited the beach, and collected sea-weeds and shells, including the *Trochus lineatus*, which was very abundant; and returning to town, visited the Roman Catholic Church, and took etchings of M'Swine's tomb-stone, with its elaborate carving, and characteristic Irish interlaced work. After breakfast the whole party left the hotel, thoroughly satisfied with the courtesy and attention of Mr. Coane and his civil assistants, and, with a hearty cheer, started for Carrick. A very rugged road gave frequent opportunities of examining the rocks, &c., along the route, and a number of specimens were collected, including conglomerates, sandstone, and carboniferous limestone, the latter containing the usual fossils—encrinites, corals, and good specimens of *Productus giganteus*, &c., &c. After passing Kilcar (which the driver said should have been called "killhorse," owing to the roughness of the roads), a few miles brought us to Carrick, the chief town of an extensive district of county, belonging to Messrs. Musgrave, of Belfast, one of whom is a respected member of the Naturalists' Field Club. This circumstance made the party feel quite "at home" at Carrick, and if there was any difficulty in feeling so, that difficulty was completely removed by the generous hospitality of Messrs. Musgrave and their lady friends at Carrick Lodge, who gave us a thoroughly hearty reception, entered into the spirit of our mission, and did everything that a friendly heart could dictate, or a generous hand accomplish for the comfort, enjoyment, and information of the several members of our large party. No time was lost in preparing for a visit to the coast. Our conductor had cars to meet us from Mallinmore, and Messrs. Musgrave had some ponies and guides to help us, and accompanied the party themselves, passing along the bank of a wild mountain stream, lined with groves of the Osmunda fern, and having a rocky rapid fall extending for a considerable distance, broken here and there by deep pools, where many a salmon is captured on its inland journey from the sea. Even here, in the wilds of Donegal, are the evidences of abortive efforts to develop the industrial resources of Ireland. Hard by the banks of the rapid flowing river stands a furnace in which the bog iron ore, so plentiful about here, was at one time smelted with peat, but failed in one

essential point—it did not pay—and the rusty fragments of the last blast remain to stimulate some future more successful enterprise in the same direction.

The grand cliff scenery begins at the western side of Teelin Bay or harbour, where the rocks, some 500 feet high, overhang the sea, and are cut into and indented by bays and fissures that unite to form a succession of picturesque groups of rocks and crags and heath-clad peaks; wild as the storm that rages round them, and varied as the sea that boils below. From Teelin the ascent of the highlands really commences, and, dispensing with the cars, the journey was undertaken on foot or on ponies. The latter proved of great advantage to the ladies, and their services were no less acceptable to the gentlemen. We soon reached Carrigan Head, where the cliffs are really grand. The high wind and angry boiling sea added not a little to the interest of the scene which poet or painter would delight to picture; but the shrill whistle of the conductor, almost lost in the noise of the storm, called us to our feet again, and a regular climb over the steep sides of the sloping hills brought us to a terrace overlooking one of the grandest views perhaps in Britain. Standing on Bunglass Point, hundreds of feet above the sea below, there is the sweep of Bunglass Bay, bounded by mural precipices rising to the height of nearly 2,000 feet, one brilliant surface of quartose rock, variegated by the changes of strata and the stains of metallic oxides, that give the whole an effective play of colours, like the iridescent tints of Labrador spar. The rolling waves of the sea beneath, dwarfed by distance, boil and seethe; above, the majestic eagle soars with his mate to their eyrie, while flocks of sea-fowl fly shrieking past; and the storm now hangs a pall on the brow of Slieve League, and again drives back the cloud and mist and rain, for the bright sunshine to light up the whole crest from Carrigan Head to Mallin Beg, forming a scene of marvellous grandeur and awful sublimity. Would that some poet worthy of the theme—some Irish Scott—would weave into immortal verse the sublime beauty of this scene, the legendary lore with which it is surrounded, and the deeds of heroic valour that may be gathered from the scattered history of Tirconnell.

Calculating upon a considerable halt at Bunglass Point, Mr. Musgrave very considerably provided a well-filled hamper of refreshments, which were produced and disposed of with gratifying acknowledgments on the green terrace we will ever remember as "Musgrave's table." The conductor's whistle again sounded the advance, and we commenced the ascent of Slieve League, over bog and heath, rocks, ferns, and mosses. The party, now reduced to eight or ten, pushed their way upwards, glad of every opportunity of calling a halt for breath, while professing the discovery of some variety of heath, new ferns, or mosses. Here the matted tufts of the wild juniper were gathered, and the red berries of the bear-berry, and amid the shady nooks of the hillside rocks the moss-like filmy fern was most luxurious up to the very limit of the "One man's path." This dangerous path is one of the attractions of Slieve League. It is a narrow path of about 20 inches wide over a rocky peak at the very edge of the cliff; the surface is a rounded weather beaten rock, with a very steep incline. At one side, next the sea, there is an almost perpendicular precipice of 1,800 feet; and at the other side a cliff some 800 feet high which meets with the mountain side below. This pass or path leads to the higher cliffs above. It is dangerous at any time, but most so when the wind blows strong. We approached it when the wind blew half a gale, so that pebbles from the cliff face were blown past like hail; nevertheless, two of our party fearlessly went over the path, but neither their cheers nor the whistle call of the conductor could induce another to follow. A circuitous path again united the party, who, after visiting the old church of St. Hugh MacBreacan, on the top of the mountain, made a rapid descent on Carrick Lodge, passing Maxwell's old tuck mill, and arriving in time for dinner at eight o'clock. Having been hospitably entertained in the true spirit of genuine friendship by our most worthy host, we reluctantly took our departure for a six miles' drive over the mountain to Mallinmore, where we arrived at 11-45 p.m., and were soon comfortably made up for the night in the friendly hostelry of Miss Walker. Next morning we were up fresh as ever, and, after an early breakfast, started off amid storm and

rain for Mallinbeg. Indeed, throughout the trip, the party seemed to despise the drenching showers we were too often favoured with; and, from the novelty of the surroundings, and the exhilarating influence of the mountain and sea air, the laborious toil through which we went completely lost its usual effect.

Returning from the shore thoroughly saturated with rain, a change of clothes and a good lunch prepared us for a run of some eight or ten miles over Glencolumkille and the adjoining cliffs, &c. Here there are many memorials of the patron saint of this locality, including the saint's bed, the saint's well, and about thirteen stations to which the country people resort for prayer. At six of these stations there are slabs of limestone set on end, with crosses cut on the surface, and all of different patterns. Having made sketches and measurements of all the crosses, and visited the various points of interest about the glen, the party took a long walk over the cliffs and headlands, and returned to the glen by the well on Craig Beefan, and arrived at Mallinmore in time for dinner at eight o'clock, after enjoying a most delightful day over romantic glens, open moorland, and wild coast scenery of surpassing grandeur.

Early next day we visited, sketched, and measured the several cromlechs or giants' graves within walking distance of the hotel, and paid a visit to the curious old mill, with its horizontal water-wheel and primitive gearing; and at noon the whole party left the pleasant little hotel, so efficiently presided over by Miss Walker and her relative, Miss Crawford, whose prompt, effective, and cheerful attention enabled the party to enjoy their visit to this remote locality with as much comfort and satisfaction as if we were lounging in the fashionable resorts of holiday tourists. It is to be hoped that the spirited landlord, whose energy is everywhere manifested throughout the estate by sundry improvements in buildings, roads, and fences, will not leave Mallinmore without enlarged accommodation, so that, with the growing interest in South Donegal, an increased number of tourists may never fail to secure the comfort and attention enjoyed by the members of the Belfast Naturalists' Field Club.

A beautiful drive through Glencolumkill, and over the moorland at its head for a few miles, brought us near Glenshesk, and, unpacking the provisions brought with us from Miss Walker's, we had a substantial luncheon in a wayside school-house, and were thereby the better prepared to enjoy the glen, to explore its river banks, and rocks, where we collected good specimens of the royal fern (*Osmunda regalis*), the filmy fern (*Hymenophyllum Wilsoni*), the beach fern (*Polypodium Phegopteris*), and the hay-scented fern (*Lastrea Oreopteris*), and thus collected in all fourteen varieties of ferns during our trip—some of the common forms not included. Soon after leaving Glenshesk we arrived at the Nesbitt Arms, Ardara, for tea, and a visit was paid the Mound and other places of interest in the locality, leaving at seven o'clock for Glenties, where we arrived late at night to severely tax the resources of the two hotels in the town. An early breakfast at six o'clock next morning (Saturday) prepared us for a drive of twenty-two miles to catch the 12-15 train at Stranorlar for Belfast; even this was successfully accomplished, and, although we had not time to take our luncheon at the hotel as proposed, yet our conductor had it conveyed to the train, where it was most acceptable during the run home, which closed the fifth day of a remarkably interesting expedition—it is to be hoped only the first of a series to the same county, now that we have demonstrated that so large a party can be comfortably accommodated at a reasonable cost, and that such an extensive and highly interesting district can be traversed in so short a time, particularly when proper arrangements are made beforehand, as they were made in this case by the conductor, one of the Secretaries of the Club.

On Saturday, 9th September,

WOODBURN GLEN.

A trip to Woodburn Glens closed the Society's programme of excursions for the year. Since the Club was established, the

members were generally fortunate in having fine days for their excursions, but for the past season their good fortune seems to have completely forsaken them, as every one of their excursions this year was wet, and Saturday was no exception. The previous day's rain continued throughout Saturday, so that out of the thirty members prepared for, only six presented themselves, and left by one of Johnston's four-horse vans, the rain falling heavily. Having driven past the salt mines of Duncrue, the party went on to the water works, and examined in detail what progress had been made in this important undertaking since the Club last visited Woodburn Glens. They found that the reservoir on the North Woodburn was very nearly full, and presented a sheet of water of about twenty-five acres, in some places thirty-six feet deep, although it wanted about two feet of top water. A good stream was still flowing into it, and below it water was collecting from every direction to fill the old river bed, and from this a good stream was flowing into the larger reservoir on the South Woodburn. The latter wanted about eleven feet of top water. This reservoir covers a space of about ninety-five acres, and on Saturday it was in some places about eighty-five feet deep. In May last the water was nearly a foot above the contemplated top water line, and on Saturday there was collected from sources below the reservoirs sufficient water to answer the requirements of the town without drawing from the stock in the reservoirs. The neighbourhood of the Belfast Water Works in the Woodburn Glen is particularly interesting to the geologist. There the industrious collector may find fossils in some abundance. A considerable number of new species have been established on the strength of specimens collected there by members of the Naturalists' Field Club, the Cretaceous fauna of the district having been abundant not only in individuals, but also rich in species, and the admirable sections exposed along the banks of the river affording ample opportunities for studying the geological phenomena there developed. Notwithstanding the rain, Saturday's search was quite satisfactory, fair examples of the following species being collected :—*Spondylius spinosus*, *Ostrea semiplana*, *Terebratula carnea*, *Rhynchonella limbata*, *R. robusta*,

Ananchytus ovatus, *Galerites albo-galerus*, *Eltheridgia mirabilis*, &c., all from the greensand rocks that formed once the bottom of a sea in which sharks and other creatures abounded. Some of the sharks' teeth were found on Saturday in the beds now forming the site of the reservoirs. The best find was a striated tooth from the chloritic chalk that crops out around the basin. The tooth was a new form to the members present, and will probably prove an addition to our list of fossil fauna.





WINTER SESSION.

NOTE.—The Authors of the various papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

THE first meeting of the Session was held on 22nd November, when Mr. WILLIAM GRAY read a paper, entitled, "An Inquiry into the Possibility and Probability of the Occurrence of Coal in the neighbourhood of Belfast."

The PRESIDENT (Professor James Thompson, LL.D., C.E.) in the chair.

The CHAIRMAN, on taking the chair, said that Mr. William Gray would read a paper, which was, "An Inquiry into the Possibility and Probability of the Occurrence of Coal in the neighbourhood of Belfast." The subject had attracted considerable public attention, and it appeared very suitable for discussion in that Club, and good advice upon the matter might either lead to valuable discoveries or save people from incurring a useless waste of money. He had great pleasure in calling on Mr. Gray to read his paper.

Mr. GRAY commenced his lecture by saying that there was nothing very interesting in a lump of coal that would attract one's special attention from its appearance, and yet it is of far more importance than its relative the diamond. The diamond, he might say, represented the aristocracy of the family; the coal

represented the bone, sinew, and utility of the family. The lecturer here gave a very excellent description of the various uses of coal, and went on to say that there were three periods in its history—viz., the period of its origin; the period that has elapsed since; and the period of its utility. It has been calculated that one foot of coal represents fifty generations of plants, each one of which represents a period of ten years, so that ten feet of coal represents five hundred years; but the united beds of coal existing in any coal field rarely measure more than fifty or sixty feet, whereas the other beds of the system frequently make up a gross thickness of from 9 to 12,000 feet. This gives some faint idea of the time it must have taken to accumulate the Carboniferous system. Since then—that is, since the coal formation—not beds merely, but whole systems of rocks have been formed, making up a gross thickness of 25,000 feet or more, all having been accumulated as sedimentary deposits in ancient seas, lakes, &c. From that calculation, coal must have been in existence for more than a period of very many millions of years. Then came the period of its use: In early times coal was used only by smiths, &c. The first grant for the winning of coal was a charter of 1239. At the close of the 14th century it was introduced into London, but the citizens rose against its use in consequence of its fumes, just as the Belfast people now protest against the Blackstaff. It was hated so much that ladies would not go to any place where it was used, lest it should spoil their complexion, and persons refused to eat meat cooked with it. Since then the consumption of coal has increased to an enormous amount, being now over three and a-half tons per annum for every person in Britain. A great question of the day was, Would the coal supply now existing last for a long time, considering the demand? And it is ascertained that, if the consumption increases to double its present consumption, the coal will be exhausted in 600 years; and within the last fifty years it has more than doubled.

The lecturer then introduced the question of the existence of coal in the vicinity of Belfast, and first illustrated the different strata of the earth, to show how coal occurs, and where it is to be

found. This he did by placing over each other, in a tilted position, a number of little logs representing the various strata, with the name on each as follows, beginning with the lowest systems:—Cambrian, Silurian, Devonian, Carboniferous, Permian, Triassic, Liassic, Oolite, Cretaceous, Tertiary, and Superficial. All these systems, excepting the Devonian and Oolite, are represented in the neighbourhood of Belfast. We must not suppose that any particular rock is confined to a special system. The limestone, although principally constituting the Cretaceous system, is found in all the others; and so the coal, although belonging to the Carboniferous strictly, is frequently found in the other strata. In the County Cavan coal is found in the Silurian rocks; and in New Brunswick and the United States the coal was obtained from the Devonian. Coal beds are also found in the Oolite, Cretaceous, and even in the Tertiary rocks. The coal of Killymurris, in County Antrim, belongs to the Tertiary age, being found in the Trap rocks. But the true stratigraphical position of coal was in the Carboniferous system, where all the great coal fields of the world were found.

Mr. Gray then pointed out the rocks that occur around Belfast, how they occur, and their relation to the Carboniferous system. This he did, with the assistance of a number of neatly-executed models and diagrams, in a very simple and popular manner; and having shown that in the neighbourhood there were the Silurian rocks of the County Down, which occur below coal, and the New Red Sandstone and Permian which occur above coal, the line between the two was the place where coal, or the Carboniferous system, should be; but, having thus found where our friend lives, the question now became, was he at home? To ascertain this, Mr. Gray said he must inquire of the neighbours—those are the surrounding strata; and he then alluded to the beds developed in the locality of Belfast, with a view of ascertaining whether there was in them any indication of the Carboniferous system, and by reference to the geological map and prepared section, he showed that beds existing in the neighbourhood were, first, the tilted and upturned Silurian strata of the County Down, and next above were the Permian beds of Cultra, which underlie the New Red

Sandstone, the Chalk and Trap of the County Antrim. He then showed that the true position of the Carboniferous system, and, consequently, the place for coal, would lie between the Permian and the Silurian of the County Down, or below the New Red Sandstone. Now, the New Red Sandstone, covered by thick beds of Chalk and Trap, extended over the greater part of Antrim, half of Derry, and a portion of Down. This area is bounded mainly by bold escarpments, along the slopes of which the successive beds are very clearly shown, and that there was no indication of the Carboniferous system anywhere along the outside limit of the Triassic beds thus extended over the County Antrim and parts of the Counties of Derry and Down, except the districts of Ballycastle and Dungannon, both of which Mr. Gray believes are completely detached from the area referred to. Coal, he said, was generally found in the Carboniferous system, lying in beds or basins on the underlying rocks ; and, as a proof that such did not exist near Belfast, he referred to the pocket or basin in the Silurian of the County Down, which was an extension of Strangford Lough into Belfast Lough, and which is at present filled with the Triassic beds that can be traced along their margin ; and, taking into account their dip and strike, together with that of the underlying Silurian rocks, there was no evidence whatever of the existence of any representation of the Carboniferous system, the small patch at Castle Espie being probably the remains of Carboniferous strata which once existed in what afterwards became the scooped-out valley just referred to, indicating that the process of denudation, which removed the Carboniferous system not only here, but all over Ireland, took place prior to the deposition of the New Red Sandstone. It was impossible to say whether the Carboniferous might not occur in pockets over the Silurian and other rocks *under* the trappean plateau of Antrim ; but they might suppose it improbable, from the fact that all over the County Down—itself remarkable for its undulating character—there are a great number of natural basins in the Silurian rocks, and in none of these are there any remains of the Carboniferous system. And taking this area covered by the New Red Sandstone, we have on its

western boundary a clean escarpment of all the district rocks, from the Trap to the underlying schists of Derry, along the eastern boundary of the valley of the Roe, near Dungiven, and on its eastern boundary near Cushendall, a similar section, and no indication of coal can be found there. The coal fields of Ballycastle and Dungannon were really very limited, and seem to be cut off from the area just referred to under the Trap and New Red Sandstone. Some persons may suppose that the beds of Ballycastle may be continued under the Antrim rocks to Dungannon, but there is no proper ground for such a supposition; on the contrary, it is clear they have no connexion. The Ballycastle coal field is clearly cut off from the other parts of the county by the schists and other primary rocks that surround the basin. The coal field of Dungannon is of a different age to that of Ballycastle. The latter belongs to a much lower zone than the former, indeed, although we have in Ireland one of the largest developments of the Carboniferous system found anywhere; that system is chiefly represented by its lower divisions—the Carboniferous Slates and Mountain Limestone; and the coal fields of the south occur in basins on the limestone; but mainly, the Coal Measures, if they were ever deposited extensively, have been removed by denudation, and now we have extensive areas of Carboniferous Limestone without the Coal Measures that once reposed upon it. We have, in fact, over the greater part of Ireland an enormous development of the Carboniferous system, but it represents only the zone that is *below* the coal. This is an answer to the often-repeated question, How is it we have no coal in Ireland? But in the north, at Ballycastle, the thick-bedded southern limestone is represented by shale, sandstone, and *coal*, like the lower Coal Measures of Scotland, which belong to a zone below the Carboniferous Limestone, it being found both in Scotland, England, and Ireland, that the limestone thins out almost to nothing towards the north, although it is several thousand feet thick in the south, and although the true Coal Measures occur over the Mountain Limestone towards the south of Britain and in other countries, yet in Scotland, and at Ballycastle in Ireland, the coal occurs below what may be con-

sidered to represent the Carboniferous limestone. Now, Dungannon field is more like the southern fields, whereas Ballycastle is similar to the Scotch fields, and therefore there cannot be any connexion or continuation of the beds. Mr. Gray also said that the Dungannon field was detached from the Antrim area by the natural depression forming the site of Lough Neagh. The Coal Measures of Dungannon very probably continued for some distance under the New Red Sandstone to the east towards Lough Neagh, but it was not likely they continued further, or there would be some indication of the shales and sandstones found along the slopes of the southern escarpment of the Antrim area forming the valley of the Lagan, but there is no representation of the sandstones of Dungannon, or Cookstown, in the Lagan valley. The New Red Sandstone system reposes directly on the Silurian rocks. The geological features, as well as the physical geography of the two localities show that they are dissimilar and unconnected. On the whole, Mr. Gray said he was clearly of opinion that, while it was barely possible to have coal near Belfast, the probability was extremely remote indeed, and he saw no hope of speculators in search of it realising any advantage.

Mr. Joseph J. Murphy, President of the Natural History and Philosophical Society; Mr. John Anderson, J.P., F.G.S., Holywood; Mr. Joseph Wright, F.G.S.; Mr. Robert Young, C.E.; Mr. M. Fitzpatrick, and Mr. Saml. Stewart, having spoken upon the paper, Mr. Gray replied, and in doing so, said (in reply to the remarks of Mr. Murphy) that he did not deny the possibility of the existence of coal on the Antrim side of the lough. He had endeavoured to prove that it was quite *possible* to exist there, but he had also endeavoured to show that it was highly *improbable*. And even if it did exist in small basins over the Silurian or older rocks below the Red Sandstone of Antrim and Derry, its uncertain position, limited area, and possible depth would render it enormously expensive to win. Mr. Anderson thought that, as we have in the neighbourhood of Belfast the succession of rocks that are found *over* the coal at Ballycastle and Dungannon, we might also expect to find the coal *below* as in those localities. Mr. Gray stated that, although we have the Trap, Chalk,

and New Red Sandstone in Belfast which occur above the coal at Ballycastle and Dungannon, we have them at Belfast clearly *resting on the Silurian rocks*, without any representation of the 300 feet of sandstones that intervene at Ballycastle, or the sandstones, limestone, grit, and Devonian rocks that intervene at Dungannon. He agreed with Mr. Wright that *one* of the best places for trying for coal was near Cultra; but the best place he thought they could try would be in the neighbourhood of Moira, and the trial should be made as near as possible to the slope of the hill. The main object should be to keep as far as possible *from* the Silurian rocks, and as *low as possible* in the New Red Sandstone, where the lowest sandstone beds were exposed; and if they wanted to make an experiment near Belfast, he thought the neighbourhood of the Gas-Works would be the proper place.

NOTE.—Since the above paper was read, Mr. Gray had the advantage of seeing the “Journal of the Progress of the Mine Works of the Bangor and Newtown Company,” being a manuscript record of certain mining operations carried on around Scrabo Hill and neighbourhood from the year 1780 up to the year 1784. This journal gives a detailed account of several shafts sunk in search for coal, some of the shafts being 240 feet deep. The result of these experiments is embodied in a report by Mr. Joseph Jackson, dated 23rd March, 1786. The journal states that “Mr. Joseph Jackson came from Dublin to view the mines, &c., by desire of the Company, and made his report thereon.”

In this report Mr. Jackson describes the several trials made, giving the position and depths of the shafts, and the strata met with, together with such information as he obtained by inquiry in the locality, and then describing the geology of the district, he concludes as follows:—“I shall now consider how far these appearances tend to discovering whether or not there may be seams or bands of coal contained in this district. We find, by quarries that are opened, as well as the borings, that the red freestone is incumbent on the white; we find also that the white freestone is incumbent on the primitive rock all round the Mountain of Scrabo; we find also that the freestone is incumbent on the primitive at Anderson’s Hill, at Bowleren, at Killarn Glen, and Kirkdonnic Glen, and in James Chambers’ land, as proved by the boring; we also find that the horizontal freestone beds rise towards the Mountain of Scrabo, and towards the primitive rock in the other places, which appearances are sufficient proofs, in my opinion, that there are no seams or bands of coal contained within the district described.

“The trial at Crawford’s Glen doth not require much investigation, for as the whole Glen and the adjoining country consists of the primitive rocks, if coal be ever found in that rock, it will be contrary to everything I have ever seen or been informed of.”

On 13th December, the following paper, on “The Geology of Cultra, Co. Down,” was read by Mr. JOSEPH WRIGHT, F.G.S.

“As one goes from Holywood to Craigavad, by the coast, the first rocks seen on the shore crop out about half way between Holywood and Cultra: the beds here are soft red sandstone (Bunter). A little farther on, these are succeeded by red and yellow sandstones, with beds of marl, considered by Mr. Hull to be Lower Keuper. At about 200 yards from the old pier at Cultra, a fault brings in dark grey fossiliferous shales and calcareous grits (Carboniferous Slate). These are well exposed to the west of the pier. Close under the battery, by Mayfield Cottage, a small exposure of rock may be seen, dark reddish grey limestone, and grey shale, rich in Carboniferous fossils; a few yards farther, under Rose Cottage, are two bands of yellow dolomite, associated with red marls and thin bedded fossiliferous limestone, laid down on our geological maps as Permian. These beds appear to be of the same age as the small outcrop just spoken of as occurring under Mayfield Cottage, a spot of much interest on account of the many well-marked Carboniferous fossils collected from it; a trap dyke runs right through the bed, but does not alter the lie of the strata, and though a few of the softer intervening beds between the two stations have been washed away by the action of the tide, yet all the strata exposed dip at about the same angle seaward, and it appears almost certain that both are conformable.

“At extreme low water mark, outside the dolomite beds, red sandstones occur, differing in no respect from the Bunter Sandstone near Holywood, and which appear to be of the same age. Several fine faults are to be seen at this place; the most easterly one brings in Carboniferous Slate, similar to what occurs west of the pier at Cultra. These strata extend along the shore as far as the great boulder under Dalchoolin. All the rocks along this shore,

though in parts slightly disturbed by trap dykes, dip pretty uniformly at a slight angle seaward, those beds farthest out being the newest.

"The occurrence of magnesian limestone in the vicinity of Cultra has for many years been a subject of interest to Irish geologists. Dr. Bryce, F.G.S., in 1835, first drew attention to these strata in a paper read before the Geological Society of Dublin, in which he stated that they were dolomitic, and should be considered of Permian age; and this view has since been adopted by all who have written on the subject.

"In one of the recently published Memoirs of the Geological Survey of Ireland, full details are given of these beds by Messrs. Hull and Warren;^{*} and Mr. Baily, under "Palæontological Remarks," records the following Permian fossils as occurring at the station, viz. :—*Productus horridus*, *Bakewellia antiqua*, *Schizodus Schlotheimi*, *Arca*, like *tumida*, *Turbo helycinus*.

"I have no remarks to make on these fossils, not having seen the Survey collection, but all those found by me in the beds are referable to Carboniferous species, viz. :—*Orthoceras inæquiseptum*, *Loxonema sulcatula*, *Cypricardia sinuata*, *Lithodendron junceum*, *Spirorbis globosus*.

"The summer of 1870 was spent at Cultra, and, while there, many fossils were found by me in the shales and limestones exposed along the shore, which had not been previously known from this station, and the facts brought to light during this investigation led me to question the received views regarding the age of some of the beds.

* There is a slight discrepancy between the general description of Messrs. Hull and Warren (p. 11), and the detailed description by Mr. Warren (p. 20). In the former, the dolomite and red marls (Permian) are made to rest on thin bedded fossiliferous limestone, of Carboniferous age; while Mr. Warren, in the detailed description, includes all these beds as Permian. The special report by Mr. Warren may be considered the correct one. It agrees best with the colouring as laid down on the Geological Survey Map (sheet 29); besides, the thin bedded limestones are the only fossiliferous strata to be met with in these so-called Permian rocks.—(See Memoirs of the Geological Survey, to accompany sheets 37, 38, and part of 29.)

"Fossils occur plentifully at the following places :—

"1st. In dark grey shales at the western side of the old pier at Cultra. (Carboniferous Slate.)

"2nd. In dark grey shales close to the great boulder under Dalchoolin. (Carboniferous Slate.)

"3rd. In shales and limestones under Mayfield Cottage.

"4th. In thin bedded limestone under Rose Cottage. (Permian of Irish Geological Survey.)

"The following is a list of the fossils collected at the above stations :—

	W. of Pier at Cultra.	W. of Boul- der under Dalchoolin	Under Mayfield Cottage	Under Rose Cottage
<i>Palæoniscus Robisoni</i> , <i>Hib. ?</i>	*	...	*	...
<i>Palæoniscus</i> sp.	*
<i>Amblypterus punctatus</i> , <i>Ag. ?</i>	*	...
<i>Holoptychius Portlocki</i> , <i>Ag.</i>	*	*	*	...
<i>Psammodus rugosus</i> , <i>Ag.</i>	*
<i>Orthoceras inæquiseptum</i> , <i>Phil.</i>	*
<i>O. cinctum</i> , <i>Sow.</i>	*
<i>Natica ampliata</i> , <i>Phil.</i>	*	...
<i>Natica</i> sp.....	...	*
<i>Pleurotomaria Yvanni</i> , <i>Lev.</i>	*	...
<i>Murchisonia angulata</i> , <i>Phil.</i>	*	...
<i>M. Sulcata</i> , <i>M'Coy. sp.</i>	*	...	*	...
<i>Macrocheilus acutus</i> , <i>Sow. sp.</i>	*	...
<i>Loxonema sulcatula</i> , <i>M'Coy.</i>	*	*
<i>Euomphalus</i> sp.....	*	...
<i>Turbo appropinquans</i> , <i>Portl.</i>	*	...
<i>Modiola Macadami</i> , <i>Portl.</i>	*	*	*	...
<i>Cypricardia sinuata</i> , <i>M'Coy.</i>	*	*	*	*
<i>Rhynchonella pleurodon</i> , <i>Phil.</i>	*	*
<i>Lithodendron junceum</i> , <i>Flem. sp.</i>	*	...	*	*
<i>Spirorbis globosus</i> , <i>M'Coy.</i>	*	*	*	*
<i>Fenestella irregularis</i> , <i>Phil.</i>	*	...
<i>Cythere Jonesiana</i> , <i>Kby.</i>	*	*
<i>Leperditia Okeni</i> , <i>Müns. Var. Scotoburdigalensis</i>	*	*	*	...
<i>Kirkbya costata</i> , <i>M'Coy.</i>	*	*	...
<i>K. annectans</i> , <i>J. and K.</i>	*	*	*	...
Plant Remains.....	*

"Of the above fossils the following may be mentioned as of special value in helping to define the age of some of the beds :—

"*Orthoceras inæquiseptum*—The discovery of this well-marked Carboniferous cephalopod in the limestone under Rose Cottage,

is due to my friend Mr. Swanston, a gentleman who has devoted much of his time to the zoology and palæontology of the north of Ireland. Several very fine examples of this fossil have been met with.

“*Cypricardia sinuata*—This fossil occurs in great profusion in the thin-bedded limestone under Rose Cottage. It is also to be met with, though more sparingly, in the Carboniferous Shales all along the shore; it bears a general resemblance to *Bakewellia antiqua* of the Permian rocks. A careful examination of a number of specimens has, however, satisfied me that it should be referred to the above species.

“*Modiola Macadami*—Many fine examples of this fossil have been met with in the dark grey shales under Mayfield Cottage, as also at several of the Carboniferous Slate localities along the shore. Specimens are not unfrequently found exhibiting beautiful iridescent coloring.

“*Lithodendron junceum*—This coral occurs plentifully in the limestones under Rose Cottage and Mayfield Cottage, as also in the Carboniferous Shales west of the Pier at Cultra; fragments of it are occasionally to be met with in all the Carboniferous Shales along the shore, and in this state have been taken by some writers for *Serpula*.

“*Spirorbis globosus*—This little annelid is to be met with everywhere along the shore, attached to fossils. Sir R. Griffith records *S. omphalodus* and *S. intermedius* as occurring in these beds. All those, however, seen by me are referable to *S. globosus*. Examples of this fossil are often found with the underside exposed, and, one so seen, looks not unlike a different species with reversed whorls. It is more than probable that it was in this way that *S. intermedius* got recorded.

“*Natica ampliata*, *Pleurotomaria Yvanni*, *Murchisonia angulata*, *Macrocheilus acutus*—These, with several other Carboniferous gasteropoda, have been met with in the thin-bedded limestone under Mayfield Cottage.

“As already shown, all the fossils found in the so-called Permian beds under Rose Cottage, as also a still greater number found in

rocks apparently conformable, and situated but a few yards away under Mayfield Cottage, are all capable of being referred to Carboniferous species, and that many of these fossils are also common to the Carboniferous Shales along the shore. It appears, therefore, to me conclusive, that the rocks under Mayfield Cottage, as also those under Rose Cottage, are of Carboniferous age, and that, at least, for the present, they may be considered as the newest of the Carboniferous Slate rocks in the vicinity of Cultra."

After the reading of Mr. Wright's paper, Mr. S. A. STEWART read a paper, entitled, "A Day with the Oyster Dredgers."

In this paper an account was given of a cruise with the oyster-fishers, on the 6th February, 1868. Mr. Stewart was accompanied by two Members of the Club interested in marine zoology, and went to Carrickfergus by train leaving Belfast at 8 a.m. On arriving at Carrick, it was found that all the dredging smacks were gone out, save one. This was a good and trusty vessel, "The Hope," Capt. Bishop, which had been detained on account of not having hands to work the dredges. We were at once received on board as volunteers, and made welcome to work our passages. The smack was manned by the captain and one hand, assisted by the three Members of the Belfast Naturalists' Field Club as volunteers. The morning was very calm, so that we had to pull "The Hope" out of the harbour by the aid of the huge oars that these boats always carry. In half an hour, however, we were relieved by a stiff breeze from the north-east which then sprung up, and increased to such an extent as to be felt by us landmen as almost too much of a good thing. After tacking several times, we were shortly off Whitehead, and in a position to commence the work of the day. Opposite Whitehead, the boat was put about, and the dredges "shot." It was fortunate for our captain that the breeze was so strong, as the five heavy dredges that were put out would have effectually anchored the boat in a light wind. The bottom selected for dredging on this day was from Whitehead to

Kilroot. We ran up from Whitehead with the full force of wind and tide; and, when opposite Kilroot, the dredges had to be hauled in—a task that fell to the share of the volunteers, and proved sufficiently trying to flexor muscles not habituated to such work. As soon as the dredges were brought in and emptied, the boat was put about for Whitehead, and then we had time to examine the material that had been brought up from the bottom, and pick out such specimens as were judged worthy.

An immense amount of apparent rubbish was brought up, and we found this “combustible” to consist of matters of almost every kind—living and dead. Masses of sea-weeds came up, embracing many species, from the coarse *Laminaria*, to delicate plumose varieties that seemed as if only made to grace an album. As might be expected, shells also came up in abundance, and specimens were obtained of species that rarely or never are seen between tide-marks. Here, too, amidst this mingled mass, were spiny sea-urchins—beautiful objects when living—besides multitudes of star-fishes—the five fingers and the prickly brittle star (*Ophiocoma*) being in profusion. Crabs there were in plenty, and of many species, from the sedentary hermit crab, that peeped out of every dead univalve’s shell, to the nimble and fierce partan. Then there was the sea-mouse (*Aphrodita*), ornamented with those long bristles, that are so beautifully iridescent. The sea-hare (*Aplysia hybrida*) must not be omitted. Like the last-mentioned, it has no connexion with its terrestrial namesake, but owes its name to a slight resemblance in form when it creeps about. When taken in the hand, it appeared like a little ball of mottled jelly, but which, in a moment or two, was hidden by the dark purple fluid which it ejected most copiously. The zoophytes that were brought up in our dredges were beyond computation. Few have any conception of the abundance of zoophyte life that exists in the depths of the sea; a single dredge often drew up a mass of zoophytes, whose individual creatures, if counted, would exceed the population of our town. There was the sea-mat, each of whose tiny meshes is tenanted by a living animal of exquisite structure, and which may be found in colonies of thousands on a single frond of sea-weed.

There were sea shrubs and sea trees, that blossom, not with flowers, but with living polypi innumerable. There was the moss-coralline, the bell-coralline, sea-threads, sea-paps, dead-man's hands, and a host of things of which those who have not gone a-dredging have no conception. The singular sea-plants called nullipores were also brought up abundantly; how the functions of vegetable life can be carried on by these seaweeds, that so soon incrust themselves with limestone, is hard to understand; but so it is: and these strange plants, doubtless, serve some useful purpose in Nature's varied economy.

This is but a very brief and imperfect account of the host of living things that we found brought forth abundantly in the waters of our bay. But how describe the odd medley of things that the dredge scrapes up from the bottom! If we drew up prizes, so we at the same time gathered old rotting weeds, whose odour was anything but inviting, with zoophyte populations that had served their day and generation, and were fast hastening to decay and corruption. Masses of dead and empty shells there were, too, that far exceeded the living ones. The universal law of death prevails as inexorably in ocean depths as it does in the upper world; and we have yet to find, and never will find, the creature that is exempt from "Nature's stern decree."

The poet has sung of the "sunless wrecks" that strew the sea bottom. We found these sunless wrecks in Belfast Bay rather a queer lot, and not at all provocative of romantic sentiment—an ancient boot, the rim of a hat, damaged tinware, black old tobacco pipes, and broken bottles most abundant of all, with fragments of delf, and, as our captain said, ruefully—everything but money. Down in the submarine depths, there is no exception to the general rule: there is beauty and repulsiveness; weakness and strength; pain and pleasure; life and death. The active, energetic creature of life may shelter beneath a mass of death and corruption, and the ugly and deformed old shell often forms the resting-place to which are attached creatures of most exquisite construction. As night came on, we devoted ourselves to arranging and stowing away our multitudinous specimens, and, as usual on such occasions,

a selection had to be made, and a number sacrificed to the exigencies of our space. The falling away of the wind, and an adverse tide, delayed the boat so much that, on arriving at the pier, we had to run for the train, at 8-30 p.m., which we reached in time, and, ere long, were at home, and ready to commence the next stage of the work—the identification and preservation of the things we had collected.

On 10th January, 1872, Rev. WM. M'ILWAINE, D.D., read a paper, on "The Stone Period."

The Lecturer commenced by a comparison between what had occurred in the department of Archæology, in the present day, with the discoveries of Geology and Comparative Anatomy, by Buckland, Cuvier, Owens, and others. The flint arrow heads, of such frequent occurrence in Ireland, and which were formerly looked upon as objects of superstition, and called elf-stones, together with stone implements of a similar class, had been collected, compared, and so connected with other objects and implements of similar origin and use, as to reveal a new era in history. The present lecture was intended chiefly to apply to the Irish remains of this description, which would be shown to have an intimate connexion with others in Great Britain and in distant localities. The Irish stone remains, consisting of celts, arrow-heads, axes, hammers, &c., were of different makes, and apparently belonging to different periods:—1. The rude and coarsely manufactured implements betokened the earliest period. 2. The polished period followed, wherein the greatest care and polish were bestowed on such articles. 3. The period when bone, horn, and rude wooden implements came into use succeeded, and brought down the date of their use and manufacture to the borders of the historic period. Such remains, of a very similar description, were almost universal, and were discovered in France, Switzerland, Belgium, as well as in the New World—similar stone remains having been found in North America, as at Niagara and elsewhere. The sources of information respecting the manufacture

and use of these articles were next referred to. These were:—

1. Bone caverns, the earliest of which—the Kirkdale Cave—was brought under notice by Dr. Buckland in 1823. French physiologists followed in their notices of such caverns, and in 1836 M. Boucher de Perthes brought under the view of his countrymen several facts which appeared to give an antiquity to the human race far beyond what had been before calculated. M. Milne Edwards, in 1861, followed in the same line of observation, and at the present day the discovery of manufactured stone implements, and even of human remains in the drift, all tended to prove the existence of a race long previously to the historic era.
2. *Lacustrine* or *lake dwellings*, similar to the *Cranogues* of Ireland, were another source of information. Those in the Lake of Zurich were among the most remarkable—discovered by Professor Keller in 1853.
3. *Sepulchral monuments*—not Celtic nor Druidical—had been discovered, evidently belonging to the same pre-historic race.
4. The *kitchen middens*, *canoes*, and *fishing implements*, but lately examined closely, were also of this period. Dr. M'Ilwaine proceeded to generalise the facts thus brought to light by modern discovery and research, and to indicate the deductions which might be, with safety, made from them. These were as follow:—

1. The *existence of a race extensively spread*, and almost identical in habits and customs, and which is to be known and identified only by such remains.
2. This race must have been of vast antiquity, and literally pre-historic. They possessed neither bard nor Druid, and consequently no historian. It would seem, however, that they professed no religion, as no remains indicative of worship, of any kind, had been discovered in connexion with it. The antiquity of this race might, to some extent, be determined by the fact that no human remains whatever had been found lower down in the geological strata than in the Quaternary formation. The precise period of the drift was, even among geologists themselves, a question of very difficult solution. The age of this pre-historic race, however, must have been of vast antiquity. The Homeric period, which seemed to have features in common between the bronze and stone periods, was 962 B.C. The Celtic

race existed 500 B.C., and Dr. M'Ilwaine gave some interesting facts from recent authorities, which seemed to indicate that this Celtic race had come in contact with the pre-historic one under consideration. 3. This race was unmistakeably *human*. The skulls discovered of its date had no approach to those of the *Quadrumana*. On them not the slightest argument could be founded for the alleged "development" of the *genus homo*. 4. There was, therefore, the strongest presumption that this race was generically identical with our own. It touches the bronze period in its implements and remains, as the latter does the iron period. We can, moreover, perceive the same advance in intelligence and civilisation in progress, even in our own day, as the collection of bone and other implements in the "Christy Collection" illustrates the earlier advance of civilisation within the historic period.

On Wednesday evening, 7th February—Mr. JOHN ANDERSON, F.G.S., Vice-president, in the chair—Mr. M. M'Minn read a paper, entitled "Remarks on Cometary Bodies."

Mr. M'MINN, in the opening of his paper, referred to the great interest connected with the "cometary bodies," and the important discoveries that have recently been made respecting their physical constitution. He then went on to relate some of the superstitious ideas which have been recorded regarding the appearance of comets in the early ages, in which he said that they were regarded as omens of pestilence, wars, famines, dethronement of monarchs, and dissolution of nations. The reader proceeded to explain the structure of a comet, and stated that the brighter part was called the head or coma, and that it contained a still brighter portion, called the nucleus, and then gave an account of the manner in which the coma and nucleus were developed. Having remarked that the tail of a comet was the most conspicuous object connected with these anomalous bodies, and that, therefore, it deserved a

more detailed explanation than any of the other phenomena connected with his subject, he gave a lucid description of the formation and development of the tail, in which, he said, that, as the comet approaches the sun, a violent action commences, the gas bursts forth in jets from the coma toward the sun, and is instantly driven back again, as smoke from a locomotive going at a great speed is driven back on its path. Immediately the jets change their position and direction, and a tail is thus formed, consisting of the vapour thrown off by the combustion of the coma, most likely by some inherent power of the sun or comet, and rendered visible by solar light. In support of this view he read a letter which he had received from Rev. Dr. Robinson, of Armagh. Mr. M'Minn having given an exhaustive explanation of the physical properties of comets, went on to say that Dr. Halley was the first to discover that comets have stated periods of revolution round the sun—a fact he ascertained from computations made on the appearance of a comet in 1682, from which he found that it revolved round the sun once in seventy-five years. Since his time the periods of revolution of hundreds of these bodies have been found out. The next comet to which he alluded was Encke's. He said that the most remarkable circumstance in connection with this body was the gradual diminution of the length of the period of its revolution, and brought forward several hypotheses to account for the phenomenon, amongst which he mentioned the "resisting medium," the diminution of volume, and also that its retardation might be due to an electric influence. The reader next referred to the appearance of Biela's comet in 1832, and its supposed collision with the earth, and pointed out the reasons why there was ground for such a supposition; and, in the discussion of the matter, stated that there was little danger of such an event occurring, the probability being, according to Arago, that, out of 281,000,000 chances, only one was unfavourable. In conclusion, the reader expressed the opinion that it was impossible to deal with the purpose for which comets were designed, and that these speculations led to the confines of the unknown, in which it was wisdom to confess ignorance.

After the reading of Mr. M'Minn's paper, Dr. J. S. HOLDEN, F.G.S., read the following, on "Giants' Graves."

"The stone monuments of the pre-historic past are of great interest, as they cast some light on an early race of people who once lived where we now live. County Antrim is rich in many of these lithic records, such as standing-stones, cromlechs, cairns, circles, and what are popularly known as giants' graves. These latter occur in many parts of Ireland, and in the west the Irish call them *Leaba Diarmada agus Grainne*—the bed of Dermot and Grace—from the Ossianic tale that Dermot O'Danne eloped with Grace, the daughter of King Cormac Mac-Art, and the betrothed spouse of the great Finn Mac-Coul. Finn pursued them, but the lovers eluded pursuit for a year and a day, sleeping at a different place each night under a *leaba* or bed erected by Dermot after his day's journey. According to this legend, there are just 366 of them in Ireland.

"Lying between Larne and Glenarm, in the townlands of Goakstown and Dunteige, are two of these "giants' graves," which were opened and examined by Lord Antrim and the reader, and found to have little to do with giants. They show three distinct parts—1st, an outer enclosure of an oblong form, which, in the Goakstown one, measures 35 feet by 16, and consists of 26 pillar blocks of basalt roughly four-sided; 2nd, a cromlech inside the enclosure at the S.W. end; 3rd, a covered alley 4 feet square and 21 feet long, in which were lying charred human remains, with fragments of rude urns, showing that this portion was used for burial by cremation.

"One of the principal objects for which "giants' graves" were erected is evidently for interments—not of an individual, but of a family or sept—as those examined contained the remains of several cremations; these, indeed, had been disturbed at some remote period—likely by the Danish pirates of the 9th century, who infested all the east coast, and generally found the old places of interment worth robbing, as often articles of value were left with the dead. But besides a place of burial, there was likely another object in their erection—that of sacrifice and worship; and for

this the cromlech was probably intended, as no trace of burial was found under it. The coincidence that all giant graves face to the N.E., where the sun rises, and that all circles having out-lying stones, have them in N.E., as Stonehenge, savours strongly of sun worship—the most ancient and general of all religions.

“It is only by the co-relation of these lithic structures with others that the mystery which enshrouds their origin is likely to be removed. It is now known that they extend in an almost unbroken line from the Himalaya Mountains through Arabia, Syria, along the shores of the Mediterranean, crossing the north of France to the Channel Islands, and reaching our own shores—from thence up to Scandinavia and the Baltic coast.

“A very singular survival of the use of stone monuments has lately been discovered in the north-east of the Himalaya range among the Khasi Hill tribes—a semi-civilized people, who still to this day erect standing-stones (menhirs) and cromlechs. The former are memorial, commemorating some benefit which the spirit of a long-departed ancestor has conferred, it is supposed, on the living. Some of these monoliths are 18 feet high, and the country is dotted over with them everywhere. Their religion is demon-worship; if a Khasias gets sick, it is owing to the enmity of some demon, and if all exorcisms fail to recover him, the sick man vows to erect a stone to some one of his forefathers, who, it is presumed, on knowing of the intention, will try to save him. Succeeding, the stone is erected, and called after this guardian ancestor.

“The cromlechs are only used for interment, and are a family receptacle, cremation being the custom. The dead are burned in a bed of logs, the bones and ashes carefully collected and placed in an urn, which is buried for a year before being placed in the family cromlech. The reason of this delay is to ascertain if the spirit of the deceased is comfortable, for, if not, some of his family get sick, or other calamity befalls. The ashes are then raised and re-interred. Such removals are only done three times, and finally, no matter how restless the ghost may be, are placed in the stone receptacle. In the older cromlechs, ornaments, &c., are interred

with the urn, but of late the custom has ceased. The Khasi tribe are, as a survival of the stone period, of great interest.

“Man is a creature of instincts, and the same necessity would, in different parts of the world, give rise to flint flakes and arrow-heads ; but neither instinct nor necessity would lead diverse savages, both in time and space, to construct identical stone monuments. Rather does it prove a community of origin among the builders, who, emigrating from a centre, left their lithic tracks over Asia, North Africa, and Europe. But what is strange is, that there is internal evidence in these structures of two races having been concerned in their erection. One, a long-headed savage, only using stone implements, and having, perhaps, a demon religion like the Khasi tribe—the other, a tall, round-headed race, with a knowledge of metals, who conquered the first : this latter race, the Celts, who, under the influence of the Druids, may have built many altars and circles, yet were modified and tainted by that earlier substratum of humanity, who, possibly, in pre-adamite times, spread from a common centre east and west. Men of the stone period blended with the men of the bronze period, and both have, by menhirs, cromlechs, circles, barrows, &c., lithographed their primitive history on the lands through which they travelled.”

An animated discussion followed the reading of Dr. Holden's paper, in which Dr. JAMES MOORE, M.R.I.A. ; Messrs. W. GRAY, ROBERT YOUNG, C.E., and W. H. PATTERSON joined.

Mr. GRAY referred to the great number of the so-called giants' graves, cromlechs, &c., that occurred within easy access of Belfast. Of cromlechs alone, he knew of about eighteen ; and as it was his intention to publish in the Club's Annual Report a complete list of all such structures in the counties of Down and Antrim, he courted the co-operation of all who were interested in such matters, and could furnish any information as to their occurrence, history, &c.

Dr. MOORE, with considerable warmth, denounced that spirit of vandalism that destroyed, or permitted the destruction, of many of our ancient monuments, and referred particularly to the destruction of the old church at the Knock, and said that the Government, through the Board of Works, or otherwise, should be called on to protect our ancient monuments.

Mr. PATTERSON explained that, with reference to the Knock Church, it was to be regretted that the picturesque ruins were suffered to fall for want of timely care, but that the gable fell when the landlord, Thomas M'Clure, Esq., M.P., was arranging with workmen to have it secured ; and that, although the old gable had fallen, yet it was possible still to have it restored. He also stated that Mr. M'Clure would probably defray the necessary cost, and the matter is now in the hands of Mr. Gray and Mr. Young, members of the Club, who had undertaken to make the requisite working drawings, and superintend the work of restoration.

This announcement was received with applause.

On 10th April, Mr. F. W. LOCKWOOD read the following paper on "The Round Towers and Early Irish Churches."

"The Irish Christian architecture may be described as a branch of the Romanesque architecture of Western Europe, but worked out in so great a degree, independently of foreign influence, and so much affected by native pre-Christian traditions, as to become almost an original style. The earliest Christian buildings now remaining in Ireland are, probably, the dome-shaped saints' houses on the west coast, with very little doubt once the residences of the saints whose names they bear, such as that of St. Finan Cam, on Church Island, Lough Corraun, County Kerry, of the sixth century ; and St. Fechin's, on Ardoileau, or High Island, Galway, but little later. These only differ from similar numerous

pagan structures by having the interior square, and are purely native in construction and origin. The Oratory of Gallerus, in Kerry, with inclined ends and sides, is as early, and may even date from the introduction of Christianity into the island. It bears no traces of foreign influence.

“The early Churches, as illustrated by the late Dr. Petrie and others, dating from the sixth and seventh centuries, are very small and simple structures, and the doors and windows show a great identity with those of the plainer of the Round Towers, many of which stand beside them. The square lintel over the door of St. Fechin’s Church, at Fore, and that of the door of the Tower at Antrim, are remarkable, each having the Irish cross carved on them in *relief*, and both are, probably, of the same age.

“This identity is much more striking in the cases of the Towers of Kildare and Timahoe, when compared with the later Churches of Killaloe, Rathain, in King’s County, Glendalough, and others. These Dr. Petrie ascribes to the eighth and ninth centuries, and they bear a strong resemblance to what remains of Anglo-Saxon architecture, but showing a delicacy and refinement in the detail peculiarly Irish, whilst all the opens have the sloping or inclined jambs characteristic of this island from the earliest times.

“The third period of Irish architecture, represented chiefly by Cormac’s Chapel, Cashel, and Tuam Cathedral, bears great resemblance to the Anglo-Norman, but was developed at least a century earlier, and has many purely Irish features.

“There are over one hundred Round Towers, more or less perfect, remaining in the country, and several in Scotland, built by Irish ecclesiastics. The Towers are too well known to need much description. The best authorities, including the leading officers of the Ordnance Survey, concur in ascribing to them a Christian origin, and the principal grounds for their belief may be stated as follow :—

“1st. Their almost invariable proximity to, and connexion with, Christian Churches or ecclesiastical establishments.

“2nd. Wherever such Churches still remain for comparison, the remarkable identity between the architectural details of each ; the

style of which details, in the third place, could not have been developed earlier than the period of the introduction of Christianity.

“4th. The resemblance of the carved ornaments to those on the sculptured crosses, and to the illuminated and embossed ornaments of the early Christian manuscripts and book covers, etc.

“5th. The Crucifixion carved over the door of the Tower of Donoughmore, which both Dr. Petrie and Mr. Du Noyer believe to be of the same period as the building of the Tower.

“6th. The use of lime mortar in their construction, the introduction of which art Ireland owes to the Christian missionaries.

“The uses of the Towers these authorities also believe to have been—

“1st, and chiefly, Strongholds, or places of refuge, to which, during those troublous and lawless ages, the ecclesiastics could retreat in cases of temporary danger or disturbance.

“2nd. Places of security for the sacred utensils and relics, including the consecrated bells.

“3rd. During the later period, they were belfries, in which the bells were hung.

“There are numerous allusions in the ‘Annals of the Four Masters,’ and other old manuscripts, to the destruction of the Towers—at least of their floors and other woodwork—by fire, and of the clergy and others who had taken refuge in them; also, some allusion to their use as belfries, which is, besides, in many places, the tradition of the country.

“Similar Towers, round or square, are found in the South of France, and the Anglo-Saxons built towers not unlike them in character, which may have been the type from which the round church towers of Norfolk and Suffolk were derived; and it is known that Irish ecclesiastics, between the sixth and the twelfth centuries, carried their own type of round tower to Scotland, Germany, and especially to the great Monastery of St. Gall (an Irish saint), in Switzerland.”

NOTICE.

EXCHANGE OF PROCEEDINGS.

THE Committee of the Club have been desirous of establishing a yearly exchange of their published proceedings with those of kindred organisations in other places, and have during the past year forwarded copies of their Eighth Annual Report to other societies. They acknowledge with thanks the receipt of the following publications, and hope that other societies whose objects are similar will favour them with copies of their proceedings as published :—

Brighton and Sussex Natural History Society—Annual Report and Abstract of Proceedings, 1870-71.....	1871
Botanical Society of Edinburgh—Transactions—Vol. XI., Part 1.....	1871
Bristol Naturalists' Society—Proceedings, 1870.....	1871
Folkestone Natural History Society—Fourth Annual Report.....	1871
Liverpool Geological Society—Abstract of Proceedings, 1870-71.. ..	1871
Liverpool Naturalists' Field Club—Proceedings, 1870-71.....	1871
Londonderry Natural History and Philosophical Society—First Annual Report.....	1871
Peabody Academy of Sciences—Second and Third Annual Reports, 1869 and 1870.....	<i>Salem, Mass.</i> 1871
Smithsonian Institution—Annual Report of Board of Regents.....	<i>Washington,</i> 1871



ANNUAL CONVERSAZIONE.

THE following is an account of the ANNUAL CONVERSAZIONE, held in the MUSEUM, on WEDNESDAY, 1st May.

(Extract from the Local Papers.)

BELFAST NATURALISTS' FIELD CLUB.

The ninth annual *conversazione* in connection with this Club took place on Wednesday evening, in the Museum, College Square North. As our readers are already aware, this annual re-union is held for the purpose of bringing before the Club the results of the past year's work amongst the various members—especial attention being, of course, given to the collections which have been submitted by them in competition for the prizes. Occupying the premier position amongst those shown, were Mr. Hugh Robinson's collection of flowering plants, representing 312 species of the plants of Ulster. This collection, which gained the first prize in that class, is to be deposited in the Museum, as a contribution towards the formation of the local herbarium. The prize for field sketches was carried off by Mr. F. W. Lockwood, the subjects being various forms of trap dykes met with in Ulster. Next came a series of drawings of the old Church in Newtownards, and for these Mr. Robert Magill Young received the special prize offered by Mr. John Anderson, J.P., F.G.S. In addition to the prize collections, there were exhibited the various diagrams and specimens used to illustrate the papers read during the Winter

Session. Prominent in this department were Mr. S. A. Stewart's series of neatly preserved objects, collected during a day with the oyster dredgers of Belfast Lough; the diagrams which accompanied Mr. Lockwood's paper on "The Round Towers of Ireland;" those connected with the lecture on "Egyptian Art," delivered before the Natural History and Philosophical Society, by Mr. T. M. Lindsay, of the Government School of Design; and also the diagrams and flint implements illustrative of the paper read before the Club by the Rev. Dr. M'Ilwaine, "On the Stone Period and Race." Around the tables a number of microscopes were exhibited by Dr. M'Ilwaine, Messrs. Swanston, Anderson, Robinson, Wright, Gray, Tomlin, and other members. Mr. Wright showed a most valuable collection of recent and fossil foraminifera, &c., which were particularly interesting from the fact that he has but recently collected from the Lias and Chalk rocks of County Antrim no less than forty different species. Mr. Wm. Gray, was, as usual, a large contributor, and prominent amongst his exhibits was a special arrangement of the microscope, by which visitors were enabled to see an object through the medium of an insect's eye, and in a space almost as small as a pin's point, to discern clearly some 260 representations of that object. In several of the microscopes were shown micro-photographs, giving a view of the group of the members of the Club, taken at an excursion to the Giant's Causeway. A number of the members' cabinets were remarkable for the ingenuity of their construction, and this was especially noticeable in the one belonging to Mr. Gray, which, though it contained a thousand objects, was so arranged that any one of them could be selected at a moment's notice. Dr. James Moore, M.R.I.A., H.R.H.A., showed several of the largest of his studies from nature. These embraced scenes at the Causeway, on Derry Walls, and in different parts of County Down, and were all painted on the spot. We need hardly say that they received a good deal of attention during the evening, for they one and all displayed a freshness and a power seldom seen even in veteran art. In the antiquarian department, some specimens were shown of a class of objects now, unfortunately, to be met with in most

collections—namely, forgeries, *i.e.*, counterfeit antiquities. The most experienced collectors are sometimes taken in by these worthless imitations, but they are more generally palmed off on beginners, whose desire to accumulate rapidly a large collection is greater than their skill to discriminate between genuine works of antiquity and those which are fabricated to imitate them. It is a time-worn adage “that demand creates supply,” and we find it to be fully applicable to the case of collectors of antiquities and objects of vertu. As soon as any classes of objects—be they coins, old manuscripts, Roman pottery, early glass or porcelain, bronze weapons, or flint implements—are inquired for, in a short time they are forthcoming in almost any quantities. It is said that when excavations are going on in London, and collectors are standing by on the watch for discoveries, that coins, encaustic tiles, bronzes, etc., are apparently exhumed under their very eyes, which have actually been placed there for the purpose of being found, and have either been “made to order” or have been purchased from a neighbouring old curiosity shop. The number and the wealth of English collectors have caused the trade of forging antiquities to flourish in that country. But we are not ourselves above suspicion, as there is good reason for believing that in County Antrim weapons of the bronze age, and stone and flint implements of all kinds, are made and sold to unwary collectors. The celebrated “Flint Jack,” whose real name was Edward Simpson, brought the imitation of flint implements, such as arrow heads, axe heads, etc., to great perfection, and even invented some types of antiquities “new to archæology.” Towards the end of his career he gave a public exhibition of his skill in chipping flints to counterfeit genuine old forms, and he stated that, in the course of his wanderings, he had visited Belfast, and had disposed of some of his wares, at good prices, to collectors. Another well-known artist in the same line was called William Smith, *alias* “Skin-and-grief,” or “Snake Willy.” He practised his art chiefly on the eastern coast of Yorkshire. Since public attention has been so much directed to the Swiss lake dwellings, and the curious finds connected with them, a manufacture of

fictitious finds has commenced in the neighbourhood. A variety of excellent photographs, chiefly of Roman and Venetian scenes, were contributed by Miss Johnston, of Dalriada ; and Mr. James Magill, of Donegall Place, showed a large collection of continental views, and also a comprehensive series of scenes in Egypt and Nubia. Some strawberry plants, bearing ripe fruit, were lent by Mr. Grieve, of Mountstewart. Mr. Greer Malcomson exhibited a series of growing ferns of remarkable beauty, and Mrs. Simpson a collection of mounted seaweeds. Professor Everett, D.C.L., had a very interesting polariscope, and Dr. J. Thomson a new form of calculating machine, which excited much curiosity. Some flamingoes shot in the North of Africa, by Mr. Francis Ritchie, were also amongst the objects exhibited. The various portions of the building were very beautifully decorated with banners, evergreens, &c., and looked remarkably well ; and, thanks to the active and energetic secretaries of the Club—Messrs. Wm. Gray and Hugh Robinson—all the arrangements were of the most complete kind. Refreshments were partaken of in the lower room, and altogether a very enjoyable and highly intellectual evening was spent.



BELFAST NATURALISTS' FIELD CLUB.

TENTH YEAR, 1871-72.

LIST OF OFFICERS AND MEMBERS.

President.

PROFESSOR JAMES THOMSON, A.M., LL.D., C.E.

Vice-President.

JOHN ANDERSON, J.P., F.G.S.

Treasurer.

GREER MALCOMSON.

Secretaries.

WILLIAM GRAY. HUGH ROBINSON.

Committee.

HENRY KNIGHT.

REV. WM. M'ILWAINE, D.D.

WM. H. PATTERSON.

WM. H. PHILLIPS.

ROBERT SMITH.

S. A. STEWART.

WM. SWANSTON.

SAML. SYMINGTON.

JOSEPH WRIGHT, F.G.S.

R. M. YOUNG,

Members.

John B. Aickin, Dover street
 W. Aickin, M.D., Murray's terrace.
 Miss Alexander, Vicinage park.
 W. J. C. Allen, J.P., Faunoran,
 Whiteabbey.
 Edward Allworthy, Mount-view.
 John Anderson, J.P., F.G.S., Hill-
 brook, Holywood.
 Robert Anderson, Ormeau road.
 Mrs. Andrews, Chlorine place.
 Ed. Neville Banks, C.E., University
 street
 James M. Barkley, Sydenham.
 William Batt, Ormeau road.
 J. G. Bell, Tullylish, Gilford.
 H. B. Benson, Islandreagh, Dunadry.
 J. M'D. Berningham, A.R.I.A.I.,
 Mount Charles.
 Arthur Black, New road, Ballyma-
 carrett.
 W. J. Boucher, Landscape terrace.
 W. H. Braddell, St. Ives, Malone
 park.
 Ed. Braddell, St. Ives, Malone park.
 Rev. S. A. Brenan, Agolagh,
 Cushendun.
 Charles H. Brett, Dunedin terrace.
 John Browne, College park.
 James Bryce, M.A., LL.D., F.G.S.,
 F.R.G.S.I., Bowe's hill, Blan-
 tyre, Glasgow. (Hon. Mem.)
 Henry Burden, M.D., Prospect,
 Ballynafeigh.
 Jno. Campbell, Mossley, Carnmoney.
 Miss Carruthers, Claremont street.
 John Charley, College park.
 J. C. Clarke, Cliftonville.
 William Clibborn, Windsor terrace.
 Sir Edward Coey, J.P., D.L., Mer-
 ville, Whiteabbey.
 John Collins, Notting-hill, Malone.
 Miss Connerey, Victoria place.
 W. J. Cooper, Upper Townsen

W. F. C. S. Corry, Mountpottinger.
 W. D. Cramp, Mount Charles.
 Alex. Crawford, Fitzwilliam street.
 W. Crawford, Jun., Fitzroy avenue.
 Edward Dale, Fitzroy terrace.
 Jno. H. Davies, Glenmore, Lisburn.
 Robert Day, F.S.A., Patrick street,
 Cork.
 George Donaldson, Mount Collyer.
 Wm. Doubleday, Donegall street.
 William Duff, Lancaster street.
 William Edgar, Lincoln avenue.
 M. Fitzpatrick, Oberon, Ballyna-
 feigh.
 William Gilmore, Jun., Cliftonville.
 G. T. Glover, Kew Cottages,
 Mountpottinger.
 Jas. Gourlay, Killinchy, Co. Down.
 Rev. John Grainger, A.M., LL.D.,
 Broughshane. (Cor. Mem.)
 Rev. James Graves, Stoneyford,
 Kilkenny. (Cor. Mem.)
 William Gray, A.R.I.A.I., Mount
 Charles.
 Forster Green, Derryvolgie, Malone.
 Henry Green, " "
 Alexander Greenfield, Holywood.
 Henry Greenhill, Balmoral.
 Mrs. Greenhill, " "
 Miss Greer, Tarbat Villa, Sydenham.
 James C. Greer, Annadale.
 Mrs. Greer, " "
 William Gregg, Willowbank.
 William Greig, Richmond.
 Hugh Hamilton, Great Victoria st.
 William Hancock, Manor House,
 Lurgan.
 W. Harte, C.E., Buncrana, County
 Donegal. (Cor. Mem.)
 William Harvey, Kinnaird street.
 James Haslett, Franklin place.
 W. B. Haynes, Lincoln Villa, Knock.
 Miss Henderson, University square.

W. D. Henderson, University sq.
 Stephen Hicklin, Ligoniel.
 Professor Hodges, M.D., Windsor.
 J. Sinclair Holden, M.D., Larne.
 George Horner, Cliftonville.
 Miss Hunter, Donegall place.
 Alexander Hunter, Cromac street.
 Thomas Hunter, Hollywood.
 H. H. Jamieson, Casaeldono, Castle-
 reagh.
 W. H. Jamieson, Lagan Village.
 F. Jennings, Cork. (Hon. Mem.)
 Miss Johnston, Dalriada, White-
 abbey.
 Miss Johnston, Glenavy, Co. Antrim.
 James Johnston, Alma terrace.
 Samuel Johnston, Antrim road.
 W. J. Johnston, Dunesk, Stran-
 millis.
 J. F. Johnstone, Royal Botanic
 Gardens.
 R. S. Joyce, Mountpottinger.
 W. Thompson Kelly, Regent street.
 Mrs. Keogh, Crumlin road.
 Dr. Keown, R.N., Dundela, Strand-
 town.
 William Kernahan, Victoria terrace.
 William King, Mount-pleasant,
 Stranmillis.
 Henry Knight, Mount-pleasant,
 Monkstown.
 W. J. Knowles, Cullybackey, Co.
 Antrim.
 Robert Kyle, Portrush.
 Miss Lamb, Divis View.
 W. W. Lamb, „
 George Langtry, Mount Charles.
 G. D. Leathem, Thornlea, Malone.
 F. R. Lepper, Sydenham.
 Miss Lester, Lonsdale street.
 T. M. Lindsay, Wilmont terrace.
 Mrs. Lindsay, „
 F. W. Lockwood, Old Lodge road.

Ferdinand Lochrane, Ulster Bank
 Armagh.
 John Love, Oldpark terrace.
 Wm. Lowry, Kinkora, Sydenham.
 John Magee, Sea-view terrace,
 Hollywood.
 Henry Major, Lisburn.
 Greer Malcomson, Shamrock Lodge
 James Malcomson, Mountpottinger.
 Mrs. Malcomson, „
 John Marsh, Donegall street.
 Joseph C. Marsh, „
 Rev. James Martin, Eglintoun,
 Antrim Road.
 Mrs. Martin, Eglintoun, Antrim rd.
 John Martin, M.D., Clarence place.
 John Millar, Lisburn.
 Miss Millar, „
 William Millar, Durham street.
 Miss Millen, Lansdowne terrace.
 James Moore, M.D., M.R.I.A.,
 H.R.H.A., Chichester street.
 John Moore, M.D., Carlisle terrace.
 David Morrow, Clarence place.
 George Molyneux, Rugby road
 E. H. Molyneux, „
 William Morris, Jun., Eton terrace.
 Hugh Morrison, Ardoyne.
 Rev. W. E. Mulgan, A.B., Dun-
 aghy Rectory, Clough, County
 Antrim.
 H. J. Mulholland, Prospect street.
 J. J. Murphy, F.G.S., Old Forge,
 Dunmurry.
 J. W. Murphy, Strandmillis.
 J. R. Musgrave, J.P., Drumglass,
 Malone.
 Robert M'Adam, College sq. East.
 James M'Clenahan, Ardoyne.
 Rev. G. Mackloskie, A.M., LL.D.,
 Ballygoney, Moneymore, Co.
 Derry.
 Miss M'Clure, Belmont.

Thomas M'Clure, J.P., D.L., M.P.,
Belmont.
Rev. E. M'Clure, Wellington park.
John M'Connell, Eglinton street.
Rev. William M'Ilwaine, D.D.,
Ulsterville.
Mrs. M'Ilwaine, Ulsterville.
Archd. M'Indoe, Donegall pass.
Daniel M'Kee, Adela place.
Robert M'Kee, A.M., ,,
John Mackenzie, C.E., Balmoral.
R. L. M'Kinney, Fleet street.
Thos. Macknight, Balmoral terrace.
D. S. M'Millan, Bridge street.
W. M'Millan, Westport, Co. Mayo.
George O'Brien, Botanic avenue.
W. D. O'Brien, "
David C. Patterson, Holywood.
W. H. Patterson, Dundela, Strand-
town.
W. B. Pearsall, Upper Merrion st.,
Dublin.
James Phillips, Virginia street.
W. H. Phillips, Lemonfield, Holy-
wood.
John Pim, Clifton Park terrace.
Joshua Pim, Crumlin terrace.
Thomas W. Pim, Evelyn Lodge,
Sydenham.
John Preston, Jun., T.C.D., Dun-
more, Antrim road.
John Pyper, Oldpark terrace.
Thomas Plimner, Virginia street.
John Reid, Donegall square West.
Francis Ritchie, The Grove.
Miss Robinson, Lisanore, Antrim
road.
Rev. Geo. Robinson, A.M., Tarta-
raghan, Co. Armagh.
Hugh Robinson, Donegall street.
Ninian J. Robinson, Consbrook ter.
W. A. Robinson, Crofton, Holy-
wood.

Edward Rogan, May street.
Richard Ross, M.D., Wellington
place.
Hugh Savage, Antrim.
Mrs. Scott, Victoria terrace.
Rev. Charles Scott, A.M., Rich-
mond.
W. M. Scott, Eglinton terrace.
R. C. Sedgewick, Holywood.
John Shelly, Whiteabbey.
William Shepherd, Holywood.
Thomas Shaw, Pakenham place.
W. S. Simpson, Upper crescent.
George K. Smith, Whiteabbey.
Robert Smith, Hughes's buildings.
Thomas Smyth, Kensington street.
Rev. George C. Smythe, A.M.,
Carnmoney.
Adam Speers, Holywood.
J. H. Staples, Lissan, Co. Tyrone.
Robert Stewart, M.D., Falls road.
S. A. Stewart, North street.
Miss Swanston, University street.
Wm. Swanston, ,,
Saml. Symington, Brookfield House.
Ralph Tate, A.L.S., F.G.S., Pierre-
mont terrace, Darlington.
(Hon. Mem.)
A. O'D. Taylor, Upper crescent.
Professor Wyville Thomson, LL.D.,
F.R.S., F.G.S., &c., Univer-
sity, Edinburgh. (Hon. Mem.)
Professor Jas. Thomson, A.M.,
LL.D., C.E., Universitysquare.
Mrs. Thomson, University square.
Miss Thomson, ,,
George Thomson, Grosvenor street.
Henry Thompson, Windsor.
Dr. W. G. W. Thompson, Bally-
money.
Miss Thorn, Millbank, Holywood.
Alex. Threlkeld, Malone road.
C. Todd, Markethill, Co. Armagh.

John Todd, Regent street.
 W. A. Todd, „
 Robt. K. Tomlin, University square.
 William Valentine, J.P., Glenavna,
 Whiteabbey.
 J. W. Valentine, Fortwilliam park.
 T. R. Walkington, Laurel Lodge,
 Sydenham.
 John S. Ward, Lisburn.
 W. R. Ward, Nea House, Christ
 Church, Hants.
 Lieut.-Col. Warrant, R.E., Fort-
 william park.
 Joseph Watson, Linen-hall Library.
 W. Watson, Londonderry. (Cor.
 Mem.)
 Alexander C. Welsh, Dromore, Co.
 Down. (Cor. Mem.)

T. K. Wheeler, M.D., Clarendon
 place.
 T. K. Wheeler, Jun., Clarendon
 place.
 David Wilson, Ballymoney.
 Miss Wilson, „
 James Wilson, Jun., Albion place.
 John Workman, Windsor.
 Rev. Robert Workman, A.M.,
 Windsor.
 Thomas Workman, Windsor.
 Joseph Wright, F.G.S., F.R.G.S.I.,
 Kinnaird street.
 James Wright, Fitzroy avenue.
 H. J. Wright, Lonsdale street.
 Robert Young, C.E., Richmond.
 R. M. Young, „
 Samuel Young, Roselands, Falls.

*Any Changes in the Addresses of Members should be communicated by
 them to the Secretaries.*





R U L E S

OF THE

Belfast Naturalists' Field Club.



I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the object of the Society be the practical Study of Natural Science and Archæology.

III.

That the Club shall consist of Honorary, Corresponding, and Ordinary Members. The Ordinary Members to pay annually a subscription of Five Shillings; and that Corresponding Members be expected to communicate a paper within every two years.

IV.

That Candidates shall be proposed and seconded at any meeting of the Club by Members present, and be then elected by a majority of the votes.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, two Secretaries, and ten Members, who form the Committee. Five to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office,

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of the district. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collection of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable; provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.

The following Rules for the conducting of the Excursions have been arranged by the Committee.

I.—The Excursion to be open to all Members; each one to have the privilege of introducing two friends.

II.—A Chairman to be elected as at ordinary meetings.

III.—One of the Secretaries to act as conductor, or in the absence of both, a Member to be elected for that purpose.

IV.—No change to be made in the programme, or extra expenses incurred, except by the consent of the majority of the Members present.

V.—No fees, gratuities, or other expenses to be paid except through the conductor.

VI.—Every Member or Visitor to have the accommodation assigned by the conductor. Where accommodation is limited, consideration will be given to priority of application.

VII.—Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII.—Those who attend an excursion without previous notice will be liable to extra charge, if extra cost be incurred thereby.

IX.—No intoxicating liquors to be provided at the expense of the Club.





Belfast Naturalists' Field Club.

TENTH YEAR.

THE Committee offer the following Prizes, to be competed for during the Session ending March 31, 1873:—

I.	For the best Herbarium of Flowering Plants, representing not less than 250 Species.....	£1	0	0
II.	For the best Herbarium of Flowering Plants, representing not less than 150 Species.....	0	10	0
III.	For the best Collection of Mosses.....	0	10	0
IV.	„ best do. Seaweeds	0	10	0
V.	„ best do. Ferns.....	0	5	0
VI.	Best Collection of Cretaceous Fossils.....	0	10	0
VII.	Do. Liassic do.....	0	10	0
VIII.	Do. Palæozoic do.....	0	10	0
IX.	Do. Marine Shells.....	0	10	0
X.	Do. Land and Fresh-water Shells.	0	10	0
XI.	Do. Coleoptera.....	0	10	0
XII.	Do. Lepidoptera	0	10	0
XIII.	Best Set of 25 Microscopic Slides	0	10	0
XIV.	Best Collection Archæological Objects.....	0	10	0
XV.	Do. Crustacea.	0	10	0
XVI.	Do. Echinodermata	0	10	0
XVII.	Six best Field Sketches appertaining to Geology, Archæology, or Natural History.....	0	10	0

In every case where three or more persons compete for a Prize, a second one, of half its value, will be awarded, if the conditions are otherwise complied with.

CONDITIONS.

No Competitor to obtain more than Two Prizes in any one year.

No Competitor to be awarded the same Prize twice within three years.

All Collections to be made personally during the Session, within the Province of Ulster. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in flower, and classified according to the natural system. The Sketches, Drawings, and Microscopic Slides to be the Competitor's own work.

No Prizes will be awarded except to such Collections as shall, in the opinions of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful Competitor.

SPECIAL PRIZES.

XVIII.—Mr. Plimmer offers a Prize of 10s. 6d. for the best Collection of any or all the objects for which the Club offers prizes, but they must be collected personally AT THE EXCURSIONS or Field Meetings of the year.

XIX.—Mr. John Anderson, F.G.S., offers a Prize of £1 1s. for the best Original Measured Drawing and details of some Ruined Building in Ireland, of not later date than the 15th century. The building selected to be different from that for which the Prize was given last year. The Prize Drawings to become the property of the Club. No Prize to be awarded unless there are three or more Competitors.

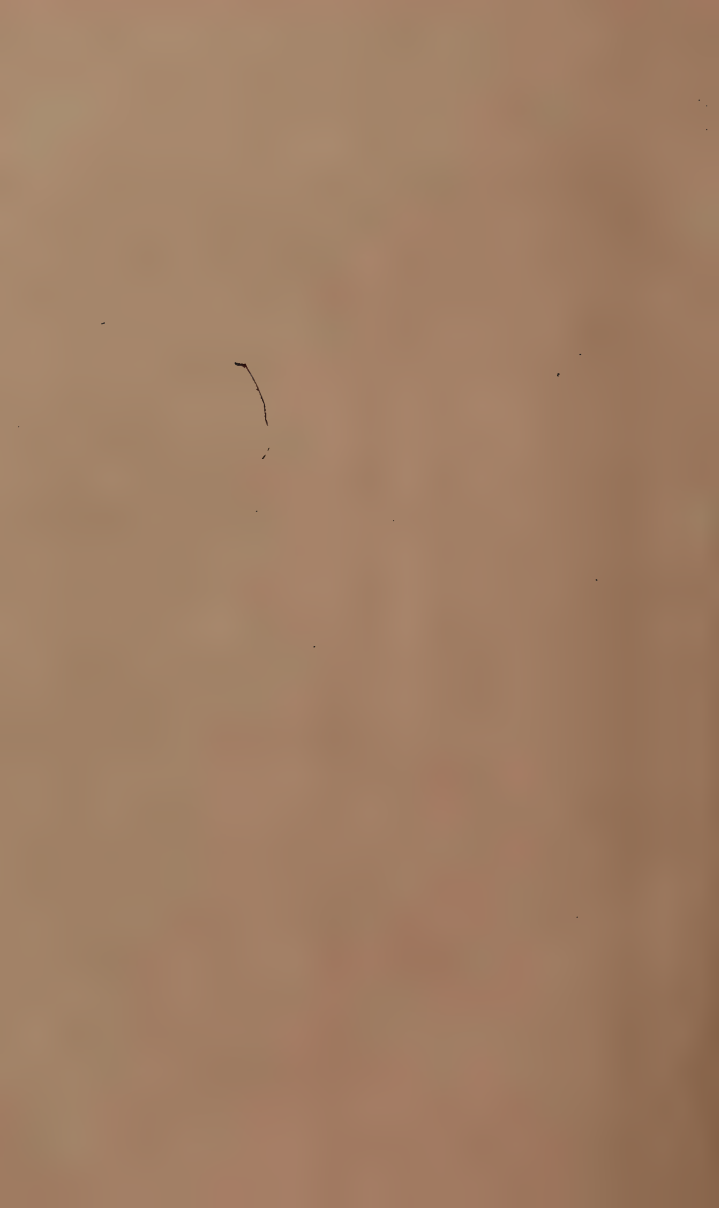
XX.—Professor James Thomson, LL.D., offers a Prize of £1 1s. for the best Essay and Oral Answering on the Optics of the Microscope. In event of there being not less than three Competitors of sufficient merit, a Second Prize of 10s. 6d. will be also given. The Oral Examinations will not be severe, and will not require answering on any difficult questions outside the scope of the Candidate's own Essay.—Further details of the conditions under which this Prize is offered will be found in the Report for 1869-70. The Essays to be given in to the Secretaries on or before the 17th March, 1873.

XXI.—Mr. J. W. Murphy offers a Prize of 10s. for the best Collection of Recent Sponges—the conditions being the same as those for Prizes I. to XVII.

Presented

11 FEB 1886





Presented
11 FEB 1886



Tenth Annual Report

OF

THE BELFAST

NATURALISTS' FIELD CLUB,

1872-73.



TENTH ANNUAL REPORT

OF THE

Belfast Naturalists' Field Club,

WITH

STATEMENT OF ACCOUNTS,

AND

A LIST OF THE OFFICE-BEARERS AND MEMBERS,

FOR THE

YEAR ENDING 31st MARCH, 1873.



BELFAST:

PRINTED AT THE "NEWS-LETTER" OFFICE,
55, 57, & 59, DONEGALL STREET.

1873.



REPORT

OF THE

Belfast Naturalists' Field Club.



YOUR Committee, having conducted the business of the Society during the tenth year of its existence, have no small satisfaction in stating that the operations of the Belfast Naturalists' Field Club, during the past year, have fully sustained the promises of former years, and the Society now occupies a very favourable position among the Field Clubs of the kingdom ; whether we compare the number of enrolled members ; its financial position ; the actual work done in popularising the subjects of its investigation ; or the additions it has made to the general stock of scientific knowledge.

As usual, a number of very interesting field meetings were held during the summer months, and the following places were visited :—

- 25th May, The Giant's Ring, Drumbo Glen, Drumbo Round Tower,
and Farrel's Fort.
- 15th June, Tynan and Caledon.
- 6th July, Ballinderry and Portmore.
- 24th to 26th July, Enniskillen, Florence Court, Upper and Lower Lough
Erne.
- 17th Aug., Slemish Mountain and Valley of the Braid.
- 7th Sept., Clandeboye and Ballykillair.

Your Committee acknowledge with pleasure the courtesy and attention with which the Members of the Society are received in almost every locality they select for their field meetings during the summer months.

Special thanks are due the Rev. W. Reeves, D.D., for the highly interesting and valuable information he gave the Members who visited Tynan and Caledon ; also to W. F. Wakeman, Esq., who assisted to organise the excursion to Enniskillen, and who accompanied the party, very much to their advantage ; also to Jas. Alex. Henderson, Esq., Mayor of Belfast, for his generous hospitality on the occasion of a visit to Clandeboye and Ballykillair.

In recording such instances your Committee are not unmindful of the kindness and attention with which the Rev. John Grainger, D.D., received his fellow Members at Broughshane.

While referring to the excursions, the Committee desire to draw attention to the discovery of a new Irish plant, on the occasion of the Members' visit to Lough Erne.

The Irish flora has now been so well investigated, the finding of a species truly indigenous, and not heretofore recorded, is a matter of considerable interest.

The plant referred to (*Hieracium tridentatum*) was found by the Rev. S. A. Brennan on rocks at the Marble Arch near Florence Court, and is only the second instance of a plant new to the flora of Ireland which the Province of Ulster has yielded for more than ten years past.

During the winter months meetings were held as usual at the BELFAST MUSEUM, alternately with the meetings of the Natural History and Philosophical Society, and the following papers were read before the Club :—

1872.

Nov. 20th.—“The Lignites of Antrim, and their relation to True Coal,” by Mr. William Gray.

Dec. 4th.—“The Capture of Carrickfergus by the French under Thurôt, in 1760,” by Mr. W. H. Patterson.

Dec. 18th.—“Life,” by Rev. Dr. M'Ilwaine.

1873.

- Jan. 22nd.—“A Notice of Flint Jack and his Works,” by Mr. William Gray.
 ,, —“Irish Antiquities and Modern Forgeries,” by Mr. William J. Knowles.
 Feb. 12th.—“Family Names as indicating the distribution of Races in Ireland,” by Rev. Edmund M’Clure.
 Mar. 12th.—“Darwinism,” by Mr. Robert Smith.

The special efforts now being made to open up the mineral resources of the north of Ireland—particularly the iron ores of the Trappean area—have tended in no small degree to direct public attention to the operations of the Club, whose members have been foremost in describing, with scientific accuracy, the nature and extent of the deposits.

During the past year, when the coal question became so absorbing, and loose opinions were expressed about the occurrence of coal in the north, the Naturalists’ Field Club was fairly represented in the discussion, and furnished, from the actual observation of its members, such an account of the geological structure of this locality, with the position and extent of its beds of fossil fuel, as might be depended upon by those who are anxious to develop the mineral resources of the country, and who could not rely on the hasty and too often erroneous predictions of interested mining speculators.

The Sub-Committee appointed at the last Annual Meeting to co-operate with the Rev. James Graves, Secretary of the Royal Historical and Archæological Society of Ireland, in furthering the Bill of Sir John Lubbock, with reference to the preservation of our National Monuments, have endeavoured to carry out their instructions, and with that view prepared a Memorial to the First Lord of the Treasury, requesting that the provisions of the Irish Church Act for that purpose should be carried out. The Sub-Committee obtained over 300 signatures of the leading citizens to this Memorial, and had the satisfaction of forwarding it through a distinguished member of the Club, Thomas M’Clure, Esq., M.P. for Belfast.

Your Committee have been most anxious to encourage, as far as possible, the competition for the prizes offered by the Club for the best collections made during the year, and, with this view, revised

the list and allotted a prize for almost every section of the Club's investigations. The result, however, has not been satisfactory, and the Committee regret that so few members availed themselves of the advantages offered.

At the same time, the number of competitors for the annual prizes is no indication of the number of really working members, as many who have distinguished themselves by taking prizes on former occasions continue to work effectively in their own departments.

Mr. William Swanston has been awarded the prize for the best collection of Native Ferns, by Mr. William H. Phillips, and Mr. Samuel A. Stewart, who kindly acted as judges on behalf of the Committee.

Your Committee are happy to find that the Annual Reports of the Club are sought after and apparently valued by a large number of scientific societies in various parts of the world, with whom your Committee encourage an exchange of transactions for mutual advantage. The names of the societies thus communicated with are appended to this Report.

The Committee have learned—not without much regret—that a necessity has arisen by which the valuable services of their late President will be lost to the Club. This necessity, however, having resulted from the election of Dr. Thompson to the Chair of Civil Engineering in the University of Glasgow, his departure from among us, and the regret at the severance of the ties of intimacy, which have so long existed between him and themselves, is considerably lessened by the consideration of his deserved promotion to a post of so greatly increased eminence and importance. It is scarcely necessary to add, that their best wishes for his prosperity and happiness in his new sphere of honour and usefulness accompany their former learned President.

WILLIAM GRAY,	} <i>Hon. Secs.</i>
HUGH ROBINSON,	

Dr.

Belfast Naturalists' Field Club in Account with Treasurer.

Cr.

To Balance from 1871-72	...	...	£41	2	0
" Subscriptions	...	...	51	0	0
" Arrears of Subscriptions...	...	...	1	10	0
" Conversazione Tickets sold	...	...	3	16	0

 £97 8 0

By Expenses of Conversazione	...	...	£12	17	6
" Printing Annual Report	...	...	11	5	1
" Advertising, Printing, and Stationery	...	...	17	16	7
" Delivery of Circulars	...	...	1	10	0
" Postages	...	...	4	1	10
" Prizes	...	...	1	15	0
" Rent of Museum	...	...	5	0	0
" Curator	...	...	3	0	0
" Loss on Excursions	...	...	2	6	0
" Subscription to Palaeontographical Society	...	...	3	3	0
" Balance on Hands	...	...	34	13	0

 £97 8 0

Audited and found Correct,

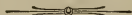
GREER MALCOMSON, Treasurer.

HUGH ROBINSON, Hon. Secretary.

S. ALEXANDER STEWART.



SUMMER SESSION.



The following Excursions were made during the Summer Session :

On Saturday, 25th May, to

THE GIANT'S RING AND DRUMBO.

Having assembled at the Ulster Hall, a party of about twenty-four left at twelve o'clock, by a specially provided conveyance, for one of the most interesting trips that could well be selected for an afternoon from Belfast. The drive along the Malone Road gives a very fair idea of what Belfast has done within a few years, both in acquiring wealth and expending that wealth in improving its suburbs by the creation of elegant buildings, mansions, villas, and terraces, and with this evidence of material prosperity, the several colleges—Queen's, Presbyterian, and Methodist—testify that intellectual progress has not been neglected. One of the most prominent of the suburban residences along the road is that of Samuel Barbour, Esq. It has been erected on what was formerly known as Pleasure-house Hill, it being one of the many old forts that remain since the earliest periods of our country's history. Some years ago it was the resort of the holiday folk from town, but long previous

to that it was employed for very much more serious purposes, evidence of which has been furnished by the discovery of cinerary urns, and stone celts or hatchets; during the progress of the building and the formation of the present ground, some sixteen or eighteen most beautiful celts were found, and several urns. These Mr. Barbour has carefully preserved, and had properly mounted in suitable cases in his library.

A little beyond Mr. Barbour's, is Cranmore, so called probably from some large tree; it is now more noted as having sheltered William of Orange and his party, when on their march to the Boyne, some 180 years ago. Crossing the Lagan at Shaw's Bridge, the party drove to the Giant's Ring, so well known to all Belfast as a remarkably good specimen of the megalithic structures of ancient Ireland. Here the Rev. Adam Montgomery received the party, and acted as their guide and friend for the day, and by his courteous manner, kind attention, and a liberal communication of a store of local information, contributed largely to the pleasure of the excursion.

Leaving the Ring, a visit was paid to Drumbo Glen, which was thrown open by the kindness of the owners, J. W. Fulton, Esq., and R. N. Batt, Esq. In this glen the botanists particularly had a busy and profitable time. A great number of plants of more or less interest were observed to be coming into flower, and many specimens secured in good condition for the herbarium, though none could claim excessive rarity. Close to the Drumbo Round Tower, the plant bearing the name of Leopard's Bane (*Doronicum Pardalianches*), was found growing spontaneously; this, however, could scarcely be reckoned as truly native; it was probably an escape from cultivation. The Round Tower was again examined as minutely as it has been hundreds of times before, and all the arguments as to its origin and use, *pro* and *con*, were discussed, and with Dr. Petrie, leaving the subject as it was found—undecided.

Farrell's Fort was next visited, and this gave the antiquarian discussion another turn, but the bulk of the party gave more attention to the extensive prospect that stretched out before them, as the

road runs high above the surrounding country, and commands a view extending from Whitehead, on the east, to Moira, on the west, along the valley of the Lagan, bounded to the north by the mountains of Divis and Collin, and on the south by the undulating hills of the County Down.

Along the road, from time to time, the botanists added to their collections, but nothing of greater interest than has been already recorded as having been collected by the Club at the two former visits to the same locality. A pleasant drive home brought the party into town at about seven o'clock.

On Saturday, 15th June,

TYNAN AND CALEDON.

The members of the Club enjoyed a very pleasant trip to Tynan and Caledon, the pleasure being very much enhanced by the presence of the Rev. Dr. Reeves, of Armagh, who accompanied the party, and described the various points of interest visited, furnishing such copious historical information regarding them as could only be acquired through an antiquary of his learning and research. Owing to the uncertain state of the weather, the party leaving Belfast was small, but several members joined at Lisburn and Portadown, and at Armagh, some members of the Armagh Natural History Society arriving at Tynan Station. The party, some on foot and some in conveyances from the Caledon Arms Hotel, left for Tynan Abbey, the beautiful demesne of Sir James M. Stronge, M.P., where some time was spent in the enjoyment of its many attractions. The Abbey is not an ecclesiastical edifice, nor is it connected with any ecclesiastical foundation ; it is simply a domestic building, in what may be considered an ecclesiastical style of architecture, its site being a portion of what are known as Bishop's Lands, and it was formerly called Fairview. The Abbey is the residence of Sir James M. Stronge, one of the members of Parliament for the county, and contains a good collection of excel-

lent paintings, some specimens of ancient glass painting, and no small variety of pottery. In the grounds there are three very good specimens of ancient Irish crosses; two of them were removed from Glenart, a few miles distant, and one was taken from Tynan. In their original position they were uncared for, and were falling into ruin; they are now well protected, and their wanting portions made good. This is some slight return for their removal from their original sites—hallowed by the time-honoured associations that hung around them.

The Abbey demesne furnishes some remarkably fine examples of trees—ash, birch, and elm. The most remarkable are probably the Spanish chestnut, which are found here in perfection, equal to the oak in the massive growth of its trunk and the bold character of its branches, but surpassing the oak in the glossy richness of its foliage. The rich and secluded plantations, such as are found at Tynan Abbey, afford retreats for some of our rarest songsters; and the members of the Naturalists' Club were delighted to hear the musical voice of the black-cap warbler, in the plantation stretching by the lake in the Abbey demesne.

Leaving the demesne, the party drove on to the village of Middleton, and from thence to Rath Trillick, one of the largest cashels in the north of Ireland. In the fifth century it was the residence of the chiefs of Ulster, and was next in importance to the celebrated fortress of Emania, near Armagh, erected 400 years before Christ, as the royal residence of the kings of Ireland, and now known as Navan Fort. Rath Trillick, the fort of the three pillar stones, occupies a site of about three acres, and is surrounded by a double ditch or fosse. The central terreplein or platform, on which the wattled houses were anciently erected, is about an acre in extent, and commands an extensive prospect of the surrounding country, so that the approach of an enemy could be observed from any quarter. This was a point of the greatest importance during the incessant contests that prevailed in the early history of the country.

From Rath Trillick the party drove back to Tynan, through a very rural district, the inhabitants of which did not seem to be accus-

tomed to such visitors, and manifested their surprise in wondering, if not admiring, groups at cottage doors and along the hedgerows. The Belfast geologists were delighted to find here and there good exposures of Carboniferous rocks, that yielded to hammer and pick a goodly assortment of fossils. Several species of fishes' teeth were collected, belonging to genera now only represented by the Port Jackson shark. Several species of these formidable creatures abounded in the Carboniferous seas. In addition to the fish remains, corals, encrinites, and shells were collected. One species of coral was very common, and formed, in some places, the bulk of the limestone rock.

In the village of Tynan another ancient cross was seen. It is a very fine example, exhibiting the usual characteristic style of carving and ornamentation. Dr. Reeves was obliged to leave at Tynan, but not before a hearty and unanimous vote of thanks was given him for the valuable services he rendered the party during the day. They then moved on to Caledon, so called probably from the quantity of nuts that formerly grew there. Dunkeld, or fort of nut trees, in Scotland, had the same origin, as well as the name Caledonia. Some of the most stirring events of the nation's history occurred around this neighbourhood. The town of Caledon had its origin in a castle which was erected close at hand in the early half of the fifth century, by a member of the great O'Neill family. In early writings it is referred to as Ceandaird. Cean-ard (pronounced Kinard) signifies "high-head," probably from the townland which had that name up to 1609. The Castle of Kinard became a place of very great importance, and there are several notices of it in "The Annals of the Four Masters." Shane Boy, who built the Castle of Kinard, was a younger brother of Henry O'Neill, who was "The O'Neill," or chief of the race. At the close of the sixteenth century, Kinard and all the territory of Munterbin, together with the territory of Turanny, in the County of Armagh, belonged to Sir Henry Oge O'Neill, and was specially excepted from the enormous tract which was granted to Hugh O'Neill, Earl of Tyrone, being known as "Henry Oge's Country." When Henry Oge received his pardon from Queen Elizabeth, in 1602, he

was resident at Portnelligan, but he soon after removed to the Tyrone part of his estate, and instead of the Castle of Kinard, he chose as his abode a structure which was erected on a small artificial island in the lake or swamp of Drummorey, which was situate on the low ground. When Sir Cahir O'Dogherty, after the death of Sir Henry Oge, in 1606, invaded the territory, we are told that he made his way across the lake of Drummorey in boats and rafts to the island that was therein, and plundered the fortress that was on it. During the Tyrone wars it was found by experience that an enclosure of water afforded greater security against a sudden attack than one of stone ; and, consequently, the native chief preferred the confinement and discomfort of a little island to the ample proportions of a building on the mainland. These islands were generally artificial, being formed by piling and stockade, filled in with clay and stones, and were known by the name of Crannogs. Such structures have been more or less in use from the earliest times ; but in the latter half of the sixteenth century they became, in the unreduced part of Ulster, the almost universal refuge of the refractory chieftains. In 1609, Robert Hovenden was resident at Kinard, and in 1613 his wife, who, by her first husband, was mother of Sir Phelim O'Neill, obtained as her jointure a grant of Drummorey, Kinard, and other lands, which were created into the manor of Kinard, with liberty of park. Here, also, Sir Phelim, when he became of age, took up his abode, and laid his plans for the rebellion of 1641. But when, in the progress of insurrection, this county was swept by the enemy's troops, he betook himself to this insular dwelling, as affording greater security than a fortress which was accessible on foot. Even this failed in its desired end, for on Sunday following the 14th of July, 1642, the English forces from Armagh "burnt Drum-orraigh, the court of Sir Phelim, and all his place." This reverse, however, did not wean him from his island, for in the month of December, 1650, it was on the Island of Drummurragh that he won over the Baron of Strabane at the eleventh hour to join him in the rebellion ; and two years after, when he was hunted down, after the rebellion was over, it was on an island, probably this, though it is not named, he was discovered, and dragged to justice

by Lord Caulfield, his captor, whose arm was nerved with vengeance for a father's murder. The district around Caledon suffered much, as it was the scene of many of the atrocities perpetrated during the rebellion of 1641, commenced by Sir Phelim O'Neill, on the 22nd of October in that fatal year. It now shares the peace and prosperity that happily prevails over the whole country, and the memory of the deeds of blood that once disturbed it only adds a melancholy interest to a district rich with historical associations, and embellished with natural beauty.

At Caledon, the party could do little more than drive through the park, of which they saw sufficient to lead to a determination to visit the place again. They had, however, an opportunity of examining another ancient cross in the grounds—this being the fifth cross seen during the day, a greater number than probably could be seen within the same space in many other places.

During the trip several rare plants were collected. The white meadow saxifrage (*Saxifraga granulata*) was found sparingly on the mound at Rath Trillick. This is a very rare Irish plant, and new to the district; it has not been heretofore recorded as occurring in Armagh or adjoining counties. At Tynan Abbey was found the slender yellow trefoil (*Trifolium filiforme*). This may be reckoned one of the best finds of the day, this slender trefoil being one of the rarest, and not hitherto observed in Armagh. Another rare plant—the lesser bank sedge (*Carex paludosa*)—was found abundantly and very luxuriant in the lake of Tynan Abbey demesne. The white dead nettle (*Lamium album*) was found on the roadside, as likewise the leopards' bane (*Doronicum Pardalianches*), and many other plants of lesser note. The marsh fern was not found, as time would not permit the party to reach the locality where it was stated to be growing.

On Saturday, 6th July,

BALLINDERRY AND PORTMORE.

The members of the Club do not always follow the beaten track

of excursionists, or confine their investigations to the common resorts of holiday folk. Some bleak mountain or some quiet hamlet is as often selected for exploration as the popular places of tourist guides. Ballinderry and Portmore were selected for the third excursion in this year's programme, and accordingly a number of well-known members of the Club, male and female, found themselves, on Saturday morning, on the narrow platform of Ballinderry station of the Antrim Junction Railway, much to the surprise of the railway officials, the two members of the R.I.C. on duty, and the farmer's boy, the only other passenger that arrived so early. The whistle that preceded the bustle of arrival was quickly followed by the whistle of the departing train, that left the station in its normal stillness. No 'bus hailed from a neighbouring inn, no jarvey competed for an expected fare, no nimble urchin volunteered to "carry it up for you, sir;" not even the newsboy's cry was heard. But such discouragement did not turn the party from their purpose. They at once prepared for and commenced their delightful walk of some three miles from the station to Portmore, on the margin of Loughbeg. The road passed through an agricultural district that in every direction afforded evidence of careful culture and a promise of a rich return. The luxuriance of the various crops, the verdure of the lanes and hedges breathing the perfume of honeysuckle and wild rose, the apparent comfort that surrounded every cottage, and the rural beauty that clothed the landscape here and there, were more than sufficient to realise the expectations of the party, and to increase their interest in a district that has sent to Belfast many of her most industrious, prosperous, and honoured commercial men. This locality is also associated with the name of Jeremy Taylor, justly styled "The Shakspeare of English divines," and who filled the united sees of Down and Connor, to which also, in his person, that of Dromore was added, in consideration of his "virtue, wisdom, and industry;" a man who, notwithstanding his opinions and prejudices, must ever be associated with the religious history and the literature of Ireland, and, indeed, with that of the nation.

Previous to his elevation to the episcopal office in 1566, Jeremy

Taylor resided either at Lisburn—then known as Lisnagarvey—or at the old castle of Portmore, the country seat of his patron and friend, Lord Conway. It was at Portmore that several of his finest and best-known theological works were written, and notably his ever-to-be-remembered “Liberty of Prophesying,” a treatise which may justly be said to have laid the foundation of that liberty in religion which is the glory and pride of the British Constitution. After a long sojourn at the seat of Lord Conway, Taylor continued to make Portmore his residence, and he possessed a tenement with a garden on an island in the Lough. This island, as well as that on which the mansion of Lord Conway stood, has become part of the mainland since the water level was lowered by the Lough Neagh Drainage Commissioners.

The castle or mansion of Lord Conway, originally erected from a design by Inigo Jones, must have been of very great importance. Very little of it now remains beyond the foundations. Some of the chambers have been converted into a garden, and some converted into farm offices; and all are overgrown with every sort of rank vegetation, which has obliterated the material structure, as its history has been covered by the growth of time. The present inhabitants of the adjoining cottages do not seem to have caught the spirit of Jeremy Taylor, or to have inherited much of the legendary lore which might be expected to have lingered about the spot. One old woman certainly heard of “one Mr. Taylor, a great man, who lived there a long time ago;” but who he was, or what was his trade, or what business he followed, she had never heard. A young lad pointed out Mr. Taylor’s wine-cellars, “under yon bush,” as he pointed to a clump of marsh mallow forcing its way through the rank weeds below it. He said, too, there was a dark passage into them, which nobody could ever find. He seemed, however, to be much more familiar with fairy lore than with the traditions of this eminent divine, and gravely related some of the doings of “the good people.” “Every year,” he said, “when the banes is ripe, a wee woman, with a white hat and a cotton dress, comes and takes three banes away with her.” He saw her once himself. Although the party had no local guide, they could satisfy themselves that they

stood on the site of the old mansion, over the rush-covered floors of which Jeremy Taylor walked, and where he enjoyed such seclusion from the troubles of his time as enabled him to enrich the literature of his country with the works above referred to. The garden wall was also traced, and a venerable old pear-tree was examined, whose trunk, now grown massive as a forest oak, was once pliant as a willow, and evidently trained along the wall it now surmounts, perhaps by gentle hands.

At a short distance from the site of the mansion stand the ivy-covered gables of what Bishop Taylor's biographer refers to as the "half-ruined church of Killulta," and where he preached in the times of the Commonwealth, before his elevation to the See of Down and Connor.

After a rough ramble over ditches and drains, meadow lands and swamps, the party reached the old church, and explored the ruins happily still remaining to guide the pilgrim who searches for traces of England's master in theology, the deeply-learned and profound thinker of Oxford, and the eloquent orator who adorned the court and camp of the unhappy monarch of the Stuart line—the First Charles, whose chaplain he was. It was Charles' still more unhappy son who nominated Jeremy Taylor to the see wherein he died, and was buried beneath the chancel of the ancient cathedral of Dromore.

From the traditions in the neighbourhood, it would seem that the old church was connected with a patron saint called Lugh, or Lu. One old lady—Miss, or Nancy Culbert—states that in her younger days, some sixty years ago, a station was annually held here on the 4th August, and was called La-Lu. Mass was said at a heap of stones between the church and the lake, and the people went round the stones on their knees. A hollow is shown on a stone in the graveyard, said to be the impression of St. Lu's knees. This hollow is said to contain water all the year round, and has the power of removing warts. Those who avail themselves of its virtue throw pins into the hollow as "trippet" (tribute). Miss Culbert says, others affirm, that instead of removing warts, the water has the power of multiplying those disagreeable epidermal

appendages. The term La-Lu must mean Lu's-day, or the festival of the saint of that name. The calendar of the saints of Ireland, in "The Martyrology of Donegal," mentions a Molua, son of Oche, Abbot of Cluain-Ferta-Molua, whose day is the 4th of August. It is just probable that this Molua was the patron saint of the Church. The prefix Mo was very commonly added to the names of saints, and simply means "my"—compare *our* lady, &c. Saint Molua worked many miracles in his life, and a place in Upper Ossory, in the Queen's County, was called Cluain-Ferta-Molua for that reason. His fame may have caused many churches to be dedicated to him, and among them the old Church of Kílulta at Lough Beg. St. Molua died A.D. 605.

Kílulta was the name of a district, and implied "the woods of Ulster;" or could it be a corruption of Killuladth (Killulla) the church of the tomb or cairn? A short distance from the church, at a place called St. Stephen's Island, a large stone is shown; and the story goes that "once on a time that stone sat on three others on the top of a hillock, and when the hill was laboured, the farmer undertook to blast the stones out of that. As luck would have it, he could not go to work that day, and next day he went early to make a job of it, when, lo and behold, the big stone, and all it sat on, was lifted clane and clever, without a 'slipe' or anything else, and was landed in the shough, where it sits to this day." Here we have evidently an account of a cromlech, or tomb. Nancy Culbert and other old folk in the locality describe a very large billy-tree, that once stood at the entrance to the churchyard. Bilê simply means "aged tree," and is applied to places where, in Pagan times, some sacred oak was an object of religious veneration. Such places were frequently chosen for the sites of Christian churches.

Portmore lake has evidently fallen back into its ancient bed, and the drainage operations of past years left it margined with flat marshy meadows. These, with the net work of wide stagnant ditches by which they are intersected, are of the highest interest to the lovers of our native botany. Plants still linger in such places that are becoming year by year more rare. Many plants, stated to have been in abundance, have disappeared, and others can with

difficulty be found. However, sufficient still remains to amply compensate the collector who boldly defies the thousands of ferocious "claggs" and the clouds of irritating gnats which are sure to assail him. Some of the party plunged resolutely into the swamp, where the leech and the dragon-fly make their homes, and, regardless of wet and mud, bad smells, and the inquisitive attention of swarms of insects, returned with a well-stocked vasculum, which, in addition to plants gathered elsewhere, made a very fair collection for the day. Among the rarer species found may be mentioned the greater spearwort (*Ranunculus lingua*). This is our finest British ranunculus, and magnificent specimens are found near Portmore. The lake margin and ditches, were studded abundantly with cowbane (*Cicuta virosa*), and the horsebane (*Enanthe phellandrium*), two of the most virulently poisonous of our native plants. The common names attached to them are indicative of the evil results to cattle when they eat the young leaves, which they sometimes do. The cowbane has been even fatal to human beings, being in some cases mistaken for wild celery. The water dropwort (*Enanthe fistulosa*) and the small spike rush—a rare plant—were also found.

Walking back to the station, the party visited Mr. W. H. Sefton, of Ballinderry, who kindly allowed them to see his garden, rockery, old oak furniture, and collection of pictures; and thus closed the day's work, which proved to be of far more interest, and afforded far more pleasure, than any one of the party could possibly have anticipated.

On 24th, 25th, and 26th July, 1872,

ENNISKILLEN, FLORENCE COURT, AND UPPER AND LOWER LOUGH ERNE.

This was the principal excursion in this year's programme, and was arranged to occupy three days. Starting by the nine o'clock train, the party arrived at Enniskillen about one o'clock, and immediately embarked on board the well-appointed steamer *Knock-*

ninny, that, with steam up and flags flying, awaited their arrival, and quickly moved off for a pleasant trip round the Upper Lake, with W. F. Wakeman, Esq., on board, ready to point out the most interesting spots, and instruct the party with his inexhaustible fund of local, legendary, and historic lore. After making a circuit round the town, darting through the central arch of the west bridge, and passing the old castle of the Maguires, the *Knockninny* was soon full way on her tortuous course, by reedy banks, overhanging trees, shallow rapids, wide-spreading reaches, and numberless islands; now starting the wild fowl from their quiet retreats, and then gliding by picturesque groups of fishing cots, or some gay crafts of the adjoining residents, while ever and anon the scenery changed, as the steamer shot through some narrow passage, rounded a wooded point, or steamed out into a wider reach. The thickly-planted demesne of some resident landlord, the hoary ruins of ancient abbeys, or the ivy-covered towers of dismantled castles, are passed on either side, while here and there cheerful homesteads and pleasant mansions peep through the surrounding foliage, and cultivated fields stretch from the margin of the lake to the distant hamlet, marked by the pointed spire of the parish church. Probably the most beautiful portion of the lake is that part where the picturesque residences of the Hon. Cavendish Butler, Captain D'Arcy, and Mr. Tipping, skirt the lake. The wooded grounds rise quickly from the irregular margin of the lake; its broken outline and just proportion of wood and water renders the scenery particularly attractive. Soon after the scene is entirely changed, and the splendid demesne of the Earl of Erne comes in view, rendered all the more interesting by the ruins of the ancient Castle of Crom, the successful defence of which was of such great importance during the wars of the Revolution. The party landed here, and were courteously shown over the pleasure grounds and castle of the Earl of Erne. Several of the members were delighted with the conservatory and nursery, in each of which there was a good display of plants in first-class condition.

Visiting the ruins of the old Castle of Crom, the party talked over the events of 1688, when Colonel Crichton successfully de-

fended the castle when besieged by King James's general, Lord Galmoy. Within the enclosure of the castle grounds stands a venerable yew, one of the oldest in the kingdom. It is several centuries old, and its spread arms cover a space of 280 feet in circumference. The branches are lateral, not vertical, and are now carefully supported on uprights, properly fixed for the purpose, in reference to which the tree says, by a printed paper on its trunk, "I am not proud, and no one can ever say that I ever held my head too high. May the courteous readers find themselves in their old age as comfortably supported as I am."

The whole party left Crom Castle early in the evening, and getting on board the *Knockninny*, steamed down the lake for Enniskillen. When going up the lake the party had dinner on board, and after dinner made several experiments with dredges and surface nets, so that on the return trip there was nothing to do but enjoy the quiet evening and delightful scenery, rendered all the more beautiful as the sun sunk lower and lower, and was at last lost in crimson and gold behind the gray outline of the distant hills. The gathering shades of evening tested the skill of the helmsman in steering by low swampy margins, wooded islands, and prominent banks that now and then threatened to stay his progress, but did not prevent him from safely landing his charge, who soon after were comfortably cared for in the cheerful hostelry of the Imperial Hotel.

Next day a similar trip was taken on the lower lake, with the exception that the weather was not so fine, but it did not, however, prevent the party from dredging the lake, and visiting the old ruins on the Island of Innismacsaint. Here St. Ninneth, a disciple of St. Finnian of Clonard, contemporary of St. Columba, founded a monastery. Sketches were made of the ruined church, and the fine old stone cross that stands close by. A visit was also paid to Castle Caldwell, and after dinner on board, the north side of the lake was visited, landing on White Island and Seventh Island. At the former there are remains of a very old church, having a very good doorway, and some carving of the kind known as Sheela-na-Gig. Devenish is well known for its remark-

able group of ancient ecclesiastical edifices, including one of the most remarkable of the remarkable round towers of Ireland. On going over the ruins the party was very much surprised to find so little care taken of what must be regarded as highly interesting historic monuments; cattle freely roam over sculptured cross and engraved slabs, rank weeds cover ancient monuments, and disgusting filth pollutes the ancient church; sculptures are rubbed off by wandering cattle, or battered by the no more careful Vandals who visit the island to sport with the relicts of ancient times; and broken mouldings, chipped ornaments, and fractured slabs, are scattered around, and rents traverse the main walls of the chief structures, which claim the attention of those whose wish or duty it is to save such historic monuments from ruin and decay.

The following resolutions referring to this subject were passed:—

“A number of members of the Belfast Naturalists’ Field Club having, during their excursion to Lough Erne, visited the island of Devenish, and examined, with much interest, the ecclesiastical remains on that spot, so celebrated in the annals of Irish history, feel it impossible to separate without giving expression to their feeling of deep regret at the state of neglect and dilapidation to which these national monuments have been reduced.”

“That a copy of the foregoing minute be forwarded to the Church Temporalities Commissioners in Ireland.”

Leaving Devenish, the party retired to the Imperial Hotel for the night. Next day, after an early breakfast, vans were prepared for a drive to Florence Court, the splendid demesne of the Earl of Enniskillen. As the day was wet, and time short, little attention could be given to the grounds, but the available time was very profitably spent in the Earl’s fine museum of geological specimens. The collection of fossil fish alone was worth the visit, and many of the members regretted exceedingly the short time they had to see them—far too short to do justice to this rich collection. A drive of about four miles further on brought the party to the so-called Marble Arch, a grand collection of overturned rocks, that would give a well-known member of the Club ample scope for

the exercise of his dashing pencil. "The Arch" is formed of massive rocks that have retained their natural bed, while all below has been washed away by the torrent, or fallen into hollows worn out by the mountain floods. The river itself disappears far up the mountain, and bursts forth again below the arch, plunging with foam and spray through rugged rocks and fallen crags, and rushes down the glen through wood and brake, now covered in foliage, now fringed with meadow, until it is lost in the lake below. About a mile above "The Arch" the party visited the caves; vast chambers cut through the mountain of limestone by the river, as it forces its way to the sea. The chambers are entered from the base of a perpendicular rock, and after a rough passage over fallen rocks, going deeper and deeper below the mountain, until a series of wide and lofty caverns are reached, the sides draped with stalactites and the floor rough as the river bed, and the water rushing through with a strange noise, and flashing in the torch-light. After spending some time in these subterranean caverns, the party hastened back to Enniskillen, and having partaken of a hearty luncheon, paid the moderate charges of the Imperial Hotel, took the train for Belfast, where they arrived about nine o'clock, having thoroughly enjoyed their delightful trip, made all the more agreeable by the courteous attention of Mr. Wakeman, of Enniskillen, who not only gave them the fullest information regarding the locality, but enabled the party to see the most in the least time, and with the least fatigue.

On Saturday, 17th August,

SLEMISH AND VALLEY OF THE BRAID.

The weather was so very unfavourable when the Club visited this locality last year, the members could not get to Slemish. This year they were far more fortunate, and under the guidance of their good friend, Rev. Dr. Granger, they were enabled to trace the footsteps of St. Patrick, and ascend the rugged sides of Sliabh-mis, or

Slemish, where St. Patrick spent so many years of his early life. Wholly apart from the historic or legendary interest with which Slemish is associated, it is well worth a visit on a clear day to enjoy the magnificent prospect it commands ; its truncated summit is a conspicuous object for dozens of miles around, and the views from it are proportionately extensive. The formal field meeting was held on the crest of the hill, the Chairman sitting in St. Patrick's seat, a naturally formed rocky chair, overlooking the whole valley of the Braid, and commanding an extensive prospect from the mountains of Derry to the eastern coast of Antrim. After a geological and botanical exploration of the mountain, the party visited what is known as " The Cashel," a circular space of about 70 feet in diameter, enclosed by a wall from 20 to 24 feet thick, and situated in the parish of Rathcavan ; it must have been a place of very great importance in former times ; in its locality there are some caves or underground chambered residences, but time would not allow the party to visit them. The whole district is one full of interest, and such as would give the archæologists of the Club matters for investigation for more than one visit, and they are encouraged to undertake the duty, with the promise of the assistance of Rev. Dr. Grainger, rector of Broughshane, who, on this occasion, not only acted as the party's guide during the day, but hospitably entertained them at his own house, before they left for the last train to Belfast.

On Saturday, 7th September,

CLANDEBOYE AND BALLYKILLAIR.

A field meeting at Clandeboye, and luncheon at Ballykillair, closed the Summer Session of the Society. For several days previously the weather was very discouraging, and Saturday promised to be like too many of this year's excursion days, decidedly wet ; but, notwithstanding the indications of Friday, and the torrents of rain that fell on Friday night and Saturday morning, a large party assembled at the Ulster Hall, and were pro-

vided with such a supply of umbrellas, rugs, and oilcloths, as to defy any threatened storm; but, as soon as the party left town by the special conveyance for the purpose, the day cleared up, and the weather for the entire day was all that could possibly be desired for such an occasion.

A pleasant drive by Sydenham, and for several miles through a succession of beautiful villas, ornamental plantations, well-kept gardens, and picturesque residences, brought the party to Hollywood, which is daily coming nearer and nearer to Belfast by the extension of its streets, terraces, and public buildings. Prominent among the latter was noticed the beautiful church of St. Collumkille, in course of erection for the Rev. James O'Laverty, the new Town Hall, the Wesleyan Church, &c.

When King John was on his way from Carricktergus to Downpatrick, in 1210, he halted "*apud sanctum boscum*." At that time it was only remarkable for a small Franciscan Priory, that probably occupied the site of the old church.

A century ago, or even later, Hollywood was only a small fishing village; whereas it is now a flourishing town. Formerly it had a good sandy beach, well adapted for bathing, but this has become covered with a deposit of mud, brought down from the polluted channel at Belfast. Even this mud is interesting to the naturalist, as it is the home of the *Synapta*, a curious worm-like creature, a blood relation to the well-known sea urchin. The *Synapta* is remarkable for its curious epidermal appendages. They are anchor-like, spicular, or thorny, and are really beautiful when seen by polarised light under the microscope.

Before leaving the town a visit was paid to the old church, which still retains a few mouldings and carvings that show the character of its original architectural embellishment. They are chiefly wrought in the local magnesian limestone found at Cultra, and which seems to have been a favourite material with ancient builders, as it is also used at the church of St. Nicholas and the castle at Carrickfergus.

Leaving the old church, the party passed Cultra, where from time to time members of the Club have collected some fine varieties of ferns, including some very good examples of *Athyrium Filix-femina*, var. *crispum*, &c.

Cultra is one of the localities in the north of Ireland where, it is said, coal should be found; but geologists find no indications to justify such an opinion; and even if coal did occur below the Permian beds of Cultra, the area they occupy is so small as to render any existing coal of little value. The Silurian rocks crop up all around, and show that the Permian or Carboniferous beds occupy only a very limited area.

Having driven on to Clondeboye House, the party was met by the respected agent of Earl Dufferin, Mortimer Thomson, Esq., who kindly pointed out all that was interesting about the grounds and in the house, including an extremely interesting series of sculptured slabs and ancient inscriptions from Syria and Egypt, collected by Earl Dufferin, and which have been tastefully arranged in the entrance hall. The several apartments of the house are also profusely decorated by a most valuable collection of paintings, all indicating the refined taste of one of our most worthy Irish noblemen, well known as a scholar and traveller, whose varied adventures in northern latitudes, skilful statesmanship in eastern countries, and valued services at home, have secured for him the proud position of representing his Sovereign in the western world.

After leaving Clondeboye House, the party visited Helen's Tower, beautifully situated on a rocky hill in the park, and commanding a most extensive prospect, including the distant hills of Scotland and the Isle of Man, and, more immediately, Strangford Lough, with its innumerable islands. The Ards, now clad with a rich harvest; the Goat's Hill, with its carn crown; Belfast harbour, with its fleet of shipping; while the wooded demesne of Clondeboye lay nearer, interspersed here and there with patches of water in the valley, that doubtless once was the hollow bed of the old sea that flowed from Strangford Lough to Belfast harbour, and from thence to Larne Lough.

Favoured by a delightfully clear atmosphere, the whole party thoroughly enjoyed the splendid view from this elegant tower and the rambles through fernbrake and pleasant glens, and were most reluctantly drawn off by the conductor's whistle to finish the day's work by a visit to the little chapel in the grounds below; but this,

too, excited their interest, as it contains several very interesting objects—one, a fine example of an old Irish sculptured cross taken from Bangor Abbey ; and another, a slab from Egypt, interesting because it was a portion of the Temple of Tirhakah, king of Ethiopia, mentioned in Scripture—2 Kings xix. 8, 9. Leaving the chapel, an hour's drive brought the party to Ballykillair, the marine residence of James Alex. Henderson, Esq., J.P., who kindly invited the Club to luncheon, and this invitation was responded to with a hearty zeal, which demonstrated that professed naturalists know how to enjoy the good things of this life as they are capable of appreciating the beautiful in nature. Hammer, pick, and vasculum were abandoned, and a company of about forty ladies and gentlemen sat down to a sumptuous repast, provided with such profuse liberality, and dispensed with such hearty and cordial goodwill on part of host and hostess, that left nothing wanting to secure the comfort and thorough enjoyment of each of their army of visitors. Thus refreshed, the company proceeded to elect new members, acknowledging the hospitality of Mr. Henderson, and thank Mr. Thompson for his attention at Clandeboye ; after which, the chairman of the day, Dr. James Moore, declared the business of the day ended, and with it the Summer Session of 1872. After tea, the company left for Belfast, where they arrived at nine o'clock p.m.





WINTER SESSION.

NOTE.—The Authors of the various papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

THE opening meeting of the Session was held on 20th November, when Mr. WILLIAM GRAY read a paper on “The Lignites of Antrim, and their relation to True Coal.”

Some years ago Mr. Gray brought this subject before the Society, but by some accident it was not referred to in the Annual Report. Mr. Gray, therefore, thought he was justified in introducing it again for three reasons:—

1st. It was formerly omitted from the Annual Report.

2nd. It is of importance, now that the public take so great an interest in the Coal Question.

And, 3rd. Mr. Gray has obtained additional information since it was first brought before the Society.

Mr. Gray referred first to the comparatively recent period at which Coal became generally used for fuel, and traced the development of the coal trade since it was first used in London about 500 years ago until the present, when the mines of Great Britain yield about 120 million tons per annum—a quantity equal to about 35 times the bulk of the Great Pyramid of Egypt, that employed 100,000 men twenty years in building.

For some time past the public, considering this enormous consumption, and the possible increased demands upon our resources

for the future, became alarmed, and began to ask is it possible for our coal mines to continue to supply this vast quantity of fuel? and if so, how long will the supply last?

Many vague and indefinite guesses were made in answer to this question, until the Government had to appoint a commission of enquiry into the probable extent and duration of our coal fields. They reported in 1871, but the evidence they received was conflicting. Professor Hull estimates the coal fields will last 1000 years; while Professor Jevons calculates that they cannot last longer than 100 years. This seems to have caused a panic among colliery owners, and as the demand for Coal had overtaken the possible supply, and the latter was limited by miners' strikes and short hours, the price of Coal went up rapidly, and will probably never again reach its former level.

This has produced two very good results—1st, an endeavour to economise our fuel so as to prevent waste; and 2nd, a desire to search for Coal wherever there is a chance of finding it; and in this country the old popular errors regarding the existence of extensive coal fields were revived. There seems to be a very strong belief commonly entertained throughout the whole country that we have plenty of Coal, but that the Government, or interested mining agents, invariably buy off speculators and prevent the mines being worked; this mischievous error it is almost impossible to eradicate. Like the mistaken notions regarding water, Coal is supposed to be constantly present at certain depths, and that it would be found anywhere if a shaft is sunk deep enough; and there are some misty ideas entertained regarding the connexion existing between Coal, Limestone, and Sandstone.

Mr. Gray then explained the geological origin of Coal, Limestone, and Sandstone, showing these were rock beds of the earth's crust common to all formations, and not necessarily connected with each other or confined to any particular zone, and that Coal, like Limestone or Sandstone, occurred in all formations from the Silurian Period to the Tertiary; but, that as the accumulation of Coal in large quantities depended upon certain conditions which seem to have existed chiefly in the Carboniferous Period, we find

that all the great coal fields of the world are belonging to the Carboniferous Period, so called, indeed, from the occurrence of such vast beds of carbonaceous matter.

But as the Carboniferous System embraces a series of rocks many thousand feet thick, and that as Coal occurs only in the central division of the system, we must pierce through great thicknesses of rocks to get at the Coal in localities where the upper portions of the system is represented; and no Coal can be found where the lower portion of the system forms the surface deposits. The former conditions prevail in England and Scotland; the latter unfortunately are too common in Ireland; and hence, although we have here the largest development of the Carboniferous System perhaps in Europe, yet because we have chiefly the lower divisions of it we have very little Coal.

In this respect Ireland is not singular, indeed there are many portions of the world much larger than Ireland that have no Coal whatever or any representation of the Carboniferous System; further, there are portions of Europe equal to six times the superficial area of Ireland that have not so great a variety of rocks as occur in our single county of Antrim.

Having explained the vegetable origin of all Coal, and the special physical conditions favourable to its accumulation during the Carboniferous Period, Mr. Gray explained that the variety of Coal from Anthracite to Lignite depended upon the nature of the flora of which they were formed, and the changes that have taken place since their deposition.

Every geological age was characterised by its own special flora, of which the Coal of that age was formed. The Silurian Period was characterised by flowerless plants, without proper stems or leaves, such as Algæ, or sea weeds. The Old Red Sandstone Period produced flowerless plants with stems and leaves, as ferns, &c., &c. The Carboniferous Period yielded flowering plants, as palms and Liliacæ, and all such as show parallel venation of leaves. The Oolitic produced Coniferæ and Cycadacæ, and the Tertiary age produced the ordinary forest trees.

Although differences in the vegetable matter constituting Coal

produced different varieties; heat, pressure, and chemical action continued for ages, produced far greater changes in the quality of Coal than could be effected from the differences in the character of the flora of which the varieties were originally formed; and the change was in proportion to the age; hence the recent deposits of Coal are least removed from the character of the vegetation composing it, while the deeper we go, or the farther back we go in time, the nearer will the Coal deposits approach the anthracitic character, the intermediate variety being bituminous.

In Ireland we have the three varieties with gradations from one into the other. The Coals of Kilkenny are anthracitic; the Coals of Leitrim, Tyrone, and Ballycastle are bituminous; and the Tertiary Lignites of Antrim retain their woody character.

In the varieties of Coal, then, we have a gradation from bituminous Coal to Anthracite, on the one side, and to peat on the other; differences depending upon the absence or presence, more or less, of bitumen, which may be considered as a modification of the resinous and oily parts of vegetable matter. Where the bitumen is in excess the Coal is known as Cannel or Parrot Coal; where the bitumen is separated from the carbon the resultant is Anthracite. The change from one variety to another occurs frequently in the same field where the bitumen is driven off by volcanic agency, similar to the separation of gas and tar from coke in the process of making gas from Coal; Anthracite, too, has been formed by artificial means.

Lignite differs from the other variety of Coal in being simply a fossil-wood more or less mineralised; it is generally of a dull brown colour, hence called Brown Coal; showing the fibres of the wood without the glistening lustre of Coal. It is found in many formations, but chiefly in the rocks of the Tertiary age.

Compared with the age of Coal, Lignite is quite a recent formation; the relative ages of geological formations can only be measured by the thickness of rocks that occur between them, and in this way we find that Coal is as much older than Lignite as the time it has taken to accumulate a series of rocks some 10 or 12 thousand feet thick that are found between them.

Coal is composed of extinct forms of ferns and reed-like plants characteristic of the Carboniferous age; whereas Lignite is composed of a flora more like our modern pines and hard-wooded plants.

Ordinary Lignite is dull, brown, and fibrous, little removed from compressed peat; but the Lignite of Antrim is solid, compact, and often glistening with the lustre of true Coal; indeed, the Lignite of Antrim is as much superior to ordinary Lignite as the latter is better than peat.

Ordinary Lignite is usually found interstratified with clay beds, or strata of sedimentary deposits; whereas the Lignite of Antrim is found embedded in masses of volcanic rocks, the basaltic rocks which cover the greater portion of Antrim, and extend into the adjoining counties of Derry, Down, Tyrone, and Armagh.

This basaltic crust was not laid down as a sedimentary rock, like the white limestone it covers, but was forced up from below, as molten lava through great rents and fissures now known as "whin dykes," and the molten matter flowed over the surface of the white limestone, not in one tremendous outburst, but by successive overflows, as is proved by the semi-stratified arrangement of the trap rocks seen at the Giant's Causeway cliffs, or wherever a section of the trap rocks is exposed.

Between the several outbursts of molten matter there must have been long periods of rest, during which the surface was exposed to atmospheric denudation, and swamps and lakes were formed as at present, in which the ochre beds and iron ores now found so extensively over the Trappean area were deposited; and rank forests doubtless skirted the margin of the lakes, the remains of which constitute the Lignite beds and carbonaceous layers occurring so frequently between the basaltic rocks, not only in Antrim but in Derry and Down; in Derry they have been found at Ballynascreen, Slieve Gallon, and Magilligan; in Antrim they occur at the Giant's Causeway, Rathlin Island, Port Bradden, Ballintoy, Glenarm, Killymurris, Shane's Castle, Kilcorrig, Carnmoney, Ballypallidy, Tardree; and in the County Down a bed of Lignite occurs at Laurencetown.

The occurrence of Lignite at the Giant's Causeway was known at a very early period, and the grandfather of the present Earl of Antrim, supposing it to be Coal, had it worked.

Lord Bristol, too, had it searched for at Magilligan and Ahanloo; but the most extensive mining was carried on at Ballintoy in 1757, by the then proprietor, Mr. Alexander T. Stewart. The origin of this mine is explained in the following extract from the very interesting and valuable pamphlet on "The Stewarts of Ballintoy," by the well known antiquarian, the Rev. George Hill:—

"In 1757, he petitioned the Irish House of Commons for aid in assisting to open coal mines at Ballintoy, stating that he had 'discovered a large body of Coals in his lands there, great quantities of which had been exported to Dublin and other parts of the kingdom.' That he had 'expended £500 in an attempt to construct a quay at Ballintoy, but was not able to proceed with the work unless aided by Parliament; that such structures, when completed, would be of great advantage to the kingdom in general, and to the north of Ireland in particular, the same being the only harbour of safety between Larne and the Lough of Derry.' To accomplish this work he asked the sum of £2,000 from the public purse. His petition was referred to a committee of sixty members, which committee, after examining three witnesses—viz., Daniel M'Collum, John M'Cay, and Thomas Moore—reported that there was 'a large fund of Coal in the colliery of Ballintoy, that a safe and commodious harbour might be made there, and that the sum of £2,000 might be granted for that purpose.' This sum was voted for the purpose above mentioned. In 1759, Mr. Stewart petitioned again, stating that he had expended £1,734 on the works, and asking for £1,234 to complete the quay. The committee reported favourably on this application also; and with this grant ended the project of a quay at Ballintoy." The bulk of this money was expended in forming a harbour at Ballintoy, and Mr. Gray was happy to say that, although at that time the attempt failed, a small harbour had since been formed at Ballintoy by the energy of Mr. Herdman. With regard to the fuel itself, he need only say that it differed very materially from true Coal.

Lignite was of a woody character, and it burned slowly, with a smouldering flame. It had a strong peaty smell, but it generated no soot, and he believed if a good fire of it was put down that morning it would remain lighted thirty-six hours after, provided it was not stirred. It did not cake and go together, and if when burning it was stirred up it fell to pieces. It also had the property of splitting up if exposed to the atmosphere for any considerable time. He might give them a description of it that was published in Dubourdieu's Statistical Survey of the County of Antrim, and which description was by the Rev. Robert Traill, Rector of Ballintoy. He says:—"In most places where I have observed this substance, columns of basalt are placed over it. In my own quarry on the glebe it is to be found underneath twenty feet of solid rock in a compressed state, or flattened appearance. The outward edges, however, have preserved in many instances a degree of roundness," &c. He goes on to say—"I can also relate, with tolerable certainty, that all this substance has been fir trees. There may be some of different species; because, where the weight has been greater, the substance becomes harder and more nearly resembling Coal, and, of course, not to be so accurately distinguished. It will not answer for the forge, as it will neither bear the bellows nor stirring. In this country it is known by the name of wood coal, and where other fuel cannot be had it proves a useful substitute. For an entire winter I used it. The smell is unpleasant, nearly resembling that which arises from the burning of rotten stick. It is also used in burning lime; but from the quantity of ashes which mix with the lime, it makes bad mortar, though good manure." Then, after referring to Mr. Stewart's labours, Mr. Traill continues—"On the west side, however, particularly in the townland of Lemnagh, it is got in great abundance. Unfortunately, both there and in Ballintoy, the pits happened to take fire, and the latter place continued to burn for several years. Various attempts were made to extinguish it, but all proved fruitless; and, finally, it was smothered by the falling-in of the superincumbent mass. This fossil wood is generally found in veins. Where these are of the least thickness, the appearance of the wood

is most distinct. These veins are from two inches to four or five feet thick, and universally run from east to west." In this description they had the reasons for giving up the Ballintoy beds. They took fire, and the top falling in, the working of them was stopped. The property at that time was sold into other hands, and his successor, living in England and elsewhere, did not prosecute the working of them, so that from that period to the present the Ballintoy beds had remained unworked.*

The bed of Lignite occurring at Ballintoy varies in thickness from one to five feet ; it occurs close under solid trap rock, resting on clay beds, and is sometimes divided into two separate beds by partings of clay ; in the pits over Ballintoy there are two such beds, each about sixteen inches thick. The upper bed is very much better than the lower bed, the latter being mixed with clay, and the three feet bed of clay parting is highly carbonaceous. The lower bed at Ballintoy yields very good impressions of plants, which Mr. Baily, of the Geological Survey of Ireland, considers identical or closely allied to leaves figured by Heer as *McClintockia Lyellii* (Fossil Flora of North Greenland, Phil. Trans., 1869, p. 52). The upper bed at Ballintoy, and all the Lignite at the west end of the field, is quite solid, black, and glistening, like true Coal.

The discovery, and more or less successful working, of what was

* Since this paper was read, Mr. Gray called a Public Meeting at the Belfast Chamber of Commerce, with the view of ascertaining the desirability of getting the Ballintoy Lignite Mines worked. The meeting approved of the suggestion, appointed a committee to test the quality of the Lignite as a fuel, and opened a Subscription List to defray the cost. As the subscriptions did not amount to £50 (whereas Mr. Gray stated that it would require about £200 to start the mines), the Committee were disposed to give up the matter ; but, at Mr. Gray's request, the small sum subscribed was expended in opening the mines, and about 20 tons of Lignite were brought to Belfast within one month. The sample of Lignite thus obtained was distributed for the purpose of testing its quality as a fuel, and the reports on the experiments confirmed all Mr. Gray stated regarding it. Since then, Mr. Fullerton, of London, one of the owners of the royalties, has continued to work the Lignite mine on his property, and Lord Antrim has let his portion to some Coleraine gentlemen, who are now making preparations to work the more extensive mines of Lemnagh, near Ballintoy.

known as Ballintoy Coal—already described—induced several persons throughout the County Antrim and Down to search in their own localities for Coal. The true geological character of the Ballintoy bed was not properly understood; it was confounded with real Coal; and every shaley black seam that cropped out anywhere was supposed to indicate the existence of Coal beds below. Not having proper geological knowledge to guide them, the enterprising explorers naturally selected for their operations those places where the Lignite was exposed on the rock surfaces or along the river banks.

One of these exposures occurred at Killymurris, about half-way between Ballymena and Ballintoy, and about two miles west of Glarryford Station, on the Northern Counties Railway. Here a pit was opened about fifty years ago, and since then mining operations have been carried on with more or less activity. The works were never conducted on a large scale. The appliances hitherto employed were of the rudest description. The yield was, therefore, uncertain and small, and not sufficient to create or maintain a steady trade. A sufficient quantity, however, has been extracted to test the quality of the fuel, which has been found to burn well, and make a cheerful fire—sufficient to satisfy the ordinary requirements of a domestic establishment. As a fuel it burns quickly, and yields a clean white ash. It emits a strong smell like turf, but more pungent. The objection to the smell of the Lignite fire could not be more than the objection once entertained towards the Coal. When Coal was first introduced and used for domestic fires, ladies and others were very strongly prejudiced against it, refusing to visit or attend parties where it was burnt, because they believed the fumes were injurious to their complexions. As at Ballintoy and elsewhere, the Lignite at Killymurris occurs between two beds of trap rock, and is about thirty feet below the surface. Lignite was also formerly worked near Portrush.

It is remarkable, too, that so far south as is Shane's Castle Park, a Lignite or carbonaceous bed occurs below the semi-columnar basalt, near the rockery. The bed is rather earthy, but lumps of Lignite may be had embedded through it; here masses of carbona-

aceous matter, like jet, were found embedded in the solid rock itself. Similar beds of Lignite occur at Ballypallidy, where the Northern Counties Railway is cut through the trap rocks. At Ballintoy and Killymurris the mass of Lignite is generally so compact and partially mineralised, the character of the wood composing it can only be detected by microscopic observation ; but at Ballypallidy the leaves, branches, and cones of fir and other trees, are commonly found in the clay beds associated with the Lignite, and they are sufficient to indicate the geological age of the rocks in which they are found. Some good specimens may be collected at Ballintoy from the lower bed of Lignite.

The Lignite bed also occurs at the west side of the basaltic area near Dungiven, in the County Derry, at the east side at Glenarm. It occurs also near Carnmoney, and was exposed when the county road was being made from Belfast to Crumlin. Its discovery here caused no small stir. It was, as usual, supposed to be true coal, and a shaft was sunk, at considerable expense, to explore the mine further, but, as in all cases where speculative zeal is in advance of scientific knowledge, the explorers failed to realise their expectations.

For fifty years the inhabitants around Knocknagor, near Laurencetown, County Down, have entertained a firm conviction that plenty of Coal was to be found in that locality. This opinion was founded upon the fact that in the bed of a small stream lumps of what was supposed to be Coal were found. A Mr. Hamilton, who lived here about forty-five years ago, had a shaft sunk, and found a bed of brown coal, which he did not consider worth working, and closed up the shaft. About twenty-five years ago a Scotch company sunk a shaft, and abandoned it like Mr. Hamilton. Two years ago another shaft was opened by Mr. Sloan, of Coalisland, and, to the surprise of the people in the locality, this too was closed up until recently, when the bed was opened up by the enterprise of local farmers.

The section at Ballypallidy, on the Northern Counties Railway, shows the sedimentary character of the Lignite, and connects it with the ochre, bole, lithomarge, and iron ore, all of which are

found together. This section also proves that the basalts of Antrim are of the same age as the Tertiary basalts of Mull and Skye, and contain similar fossils.

In the *Quarterly Journal of the Geological Society*, vol. vii., 1851, p. 89, the Duke of Argyle describes the leaf beds of the Tertiary age that occur in the Isle of Mull, and in the same Journal for August, 1869, Mr. Baily describes the plant remains found at Ballypallidy, County Antrim. In the Mull beds are found remains of the plantain family, the pine tribe, equiseta, and ferns; and Sir Charles Lyell, on the authority of Professor Heer, attributes one species to *Sequoia Langsdorfi*. At Ballypallidy Mr. Baily identified *Pinus Plutonis*, like the cluster pine; *Cupressites*, like the ordinary cypress, and a *Sequoia* (which he called after the late Mr. Du Noyer), like the red cedar of California; together with shrubs like buckthorn, and some insect remains.

Mr. Tate and Dr. Holden, members of the Belfast Naturalists' Field Club, in their paper on the Iron Ores of Antrim, published in the *Quarterly Journal of the Geological Society* for May, 1870, added several species to those enumerated by Mr. Baily, and also showed that the plant remains were known and reported upon before Mr. Du Noyer's alleged "discovery;" and in this paper we find an account of the plant remains from the ash beds on the shore of Lough Neagh, collected by Dr. Bryce, F.G.S., amongst which Mr. Tate identified *Plantanus Aceroides* and *Sequoia Langsdorfi*.

We must now refer to another deposit of Lignite occurring along the shore of Lough Neagh. Sir Richard Griffith, in reporting on this matter, says:—"The most important deposit belonging to this class is situated along the south-eastern margin of Lough Neagh, between Washing Bay, near Mountjoy Castle, in the County Tyrone, and Sandy Bay, in County Antrim. In the County Tyrone, and the northern part of Armagh, this deposit occupies a district of ten miles in length by five miles in breadth, it is composed of alternations of white, brown, and greenish blue clay, with white and grey sand, and irregular beds of Lignite or wood coal, and, on the margin of Lough Neagh, of silicified wood." Sir Richard

Griffith also describes a boring made in Sandy Bay, and in a depth of 76 feet there occurred three beds of Lignite, one 25 feet, one 15 feet, and one 20 feet thick, giving 60 feet of Lignite, and 16 feet of clay.

This deposit had been previously described by Dr. Boate in 1652, Dr. Molyneux in 1684, and by Barton, in lectures on the Natural History of Lough Neagh, 1757. Subsequently it was fully described by Dr. Scouler, in a paper read before the Geological Society of Dublin, January, 1837. Dr. Scouler, referring to Barton's description of the occurrence of the silicified wood in the Lignite beds opposite Ram's Island, says:—"This stratum of wood is of one uniform mass, and is capable of being cut with a spade. Sometimes the wood will not easily break, in that case it requires the aid of some other wood to separate it from the mass, and may, if properly done, afford a block of two, three, or four hundred pounds, which being carefully examined is found to consist more or less of stone." Here we have the well known silicified wood of Lough Neagh described as occurring *in* the Lignite of the Tertiary clays.

Colonel Portlock, in his report on the Geology of Londonderry, Tyrone, and Fermanagh, says:—"In respect to this connection of the basalt with the silicified woods, more evidence is necessary."

Mr. Gray then described the occurrence of silicified wood in the basalt at Laurencetown, where there is a bed of Lignite in the basalt about 30 feet below the surface, and in this Lignite there are layers of wood charged with silicious matter, and resembling the wood erroneously supposed to be petrified by the waters of Lough Neagh. The latter is often found quite hard outside, but when broken portions of the inside are quite soft and fibrous, like Lignite, and pass from soft wood into compact stone, the semi-silicious portions being almost identical with the hard portions of the Laurencetown Lignite. This fact supplies the evidence Colonel Portlock admitted was wanting.

The Rev. Dr. Macloskie, in an elaborate paper read before the Natural History and Philosophical Society, in February, 1872, very fully described the silicified wood of Lough Neagh, and after a careful microscopic examination, he states that "in all essential characters it agrees with the wood of the cypress."

We therefore find, that with the plant remains collected by Dr. Bryce from the Lough Neagh ash beds, Mr. Tate has found *Sequoia Langsdorfi*. We have the same plant occurring in the leaf beds of Mull, as recorded by Sir Charles Lyell; and the general character of the Ballypallidy beds, as well as their plant remains, are almost identical with the Lough Neagh ash beds and the Isle of Mull leaf beds. Then we have the wood of the cypress detected in the Ballypallidy beds by Mr. Baily, and the silicified wood of Lough Neagh is declared to be the same by Dr. Macloskie. Then we have the petrified wood of Lough Neagh found in connection with the Lough Neagh Lignites, as described by Barton, and the silicified wood with the basaltic Lignite at Laurencetown, as now described, so that a connection is thus established between the Mull and Ballypallidy beds, the Lough Neagh ash beds and silicified wood, and the basaltic Lignite of the County Antrim and the section at Ballypallidy, as well as the occurrence of Lignite in the iron ore deposits at Broughshane and elsewhere, indicating that the Lignite and the iron ore deposits are of the same age.

Mr. Gray having referred to the question of utilising the vast stores of fuel with which our bogs abound, and the efforts made to convert the peat into an artificial coal, concluded by stating that, although the results of the experiments already made are not as favourable as should be desired, they do not exclude the hope that the time is not far distant when the bogs of Ireland will prove wide fields of enterprise, wherein the native industry of our people may be profitably employed, and our commercial prosperity largely promoted.

On 4th December, Mr. W. H. PATTERSON, M.R.I.A., read a paper on "The Capture of Carrickfergus by the French under M. Thurôt, in February, 1760."

After briefly describing the political state of Europe at the close of the year 1759, Mr. Patterson mentioned the various rumours which were current in Great Britain as to expected invasions of our shores by expeditions, which, it was known, were being

fitted out in the northern ports of France. The great expedition under Admiral Conslans sailed out of Brest harbour on the 14th November, 1759, but it was not fated to reach our shores, Sir Edward Hawke having completely broken its strength in the engagement off Belleisle. It was known in this country that M. Thurôt had been placed in command of a small French squadron, also for invasion purposes, and that he was lying in the harbour of Dunkirk, waiting for an opportunity of evading the watchfulness of Commodore Boys, who was blockading him there. On the 5th of October, 1759, Thurôt managed to carry his squadron out of Dunkirk, in the midst of a severe gale; he arrived at Ostend the next day, and then bore away, through stress of weather, for Gottenberg, in Sweden. Thurôt's squadron consisted of five frigates, *The Marshall Belleisle*, *La Blonde*, *Terpsichore*, *Amaranthe*, and the *Begon*, along with two cutters.

The ships carried, in addition to their own complement of sailors, 1,270 soldiers, volunteer drafts from the king's guards, and other regiments, under the command of General de Flobert. Severe weather confined Thurôt to Gottenberg for more than a month, and immediately after sailing, a storm scattered his vessels; the *Begon* and cutters are heard of no more, and with four frigates he is glad to take shelter in Bergen, in Norway.

After leaving Bergen, Thurôt's ships were driven about for upwards of ten weeks, in mid winter, among the rocks and mists of the northern and western shores of Scotland, till on the 16th of February, 1760, the expedition arrived in a shattered condition off the island of Islay, where fresh provisions were purchased for the starving crews, many of the soldiers and sailors having already died from the hardships of the voyage. Shortly before arriving at Islay, the *Amaranthe* frigate had separated from her companions, and made the best of her way to France, arriving at St. Malo on Feb. 17th, with her ship's company almost dead with fatigue, hunger, and thirst. After leaving Islay, Thurôt, with his three remaining ships, made direct for the Irish coast, and, on the morning of Thursday, the 21st February, cast anchor close to Carrickfergus.

Here a difference of opinion took place between Thurôt and

General de Flobert, the latter, according to the formula of his profession, not wishing to pass by Carrickfergus without reducing it; the former wishing to attack and occupy Belfast, from which, he affirmed, he could have obtained supplies of all kinds and have gleaned a sum of £50,000, whereas the town of Carrickfergus would not be worth sixpence to the expedition. Thurôt, however, was over-ruled, but he was quite right in his estimate of the affair, and after the failure of Flobert's plan, was heard to swear that he would have the officers of the land force cashiered so soon as they returned to France. The French landed between 700 and 800 men at Kilroot, and marched on Carrickfergus, the garrison of which consisted of a small detachment of the 62nd Regiment, under the command of Col. Jennings, wretchedly supplied with arms and ammunition; the castle was totally out of repair, having no guns mounted, or provisions; in this latter respect, so totally unprovided were they, that on the defenders, consisting of a small party of soldiers and some of the townspeople, retiring into the castle, the mayor and some others of the inhabitants sent in their private stores of beef, meal, &c., for the use of the defenders. The French landed some of their cannon, and after forcing the gate, with considerable loss, they assailed the castle, battering the gates and walls, and forming in the latter a breach 50 feet wide.

A very fierce assault was now made upon the gate, and some severe hand-to-hand fighting took place, in which the French loss was very heavy.

The defending party, consisting of about 50 soldiers and townspeople, headed by Col. Jennings, Lord Wallingford, Capt. Bland, Lieut. Ellis, and some local gentlemen, repulsed the French, and caused them to take shelter under some adjoining walls. The garrison had now some time to consider what course should be taken, and finding that the castle in its ruinous state could not be defended, that their supplies were exhausted, and that the French party greatly outnumbered them, resolved to capitulate; this was accordingly done, and the fighting was at an end. The chief anxiety of the French was now to get provisions, and these the town undertook to provide.

On the day after the capture of Carrickfergus, the French sent one of their officers with a letter to the sovereign of Belfast, saying—"Send us 30 hogsheads of wine, 40 of brandy, 60 barrels of beer, 6,000 pounds of bread, and 60 bullocks, if you don't do this immediately, we intend burning Carrickfergus, and then doing the same to Belfast." A considerable portion of these supplies were sent. During the next few days the alarm spread over the country, and a number of regiments were set in motion to march towards Carrickfergus from different parts of Ireland. Some four or five thousand of a very irregular kind of local militia assembled in Belfast; these latter showed a considerable amount of prudence; they formed an entrenchment near the Milewater Bridge, and marched down along the shore each day to within about two miles of Carrickfergus, and then marched carefully back again at night. The French would not come out to be killed, and they retained undisturbed possession of Carrickfergus till the evening of Tuesday, the 26th, when Thurôt embarked his whole party and sailed away; when the wind being contrary to his making his way down channel, he bore away for the Scottish coast, and cast anchor in the bay of Luce. In the meantime, Captain Elliot, who was lying in the harbour of Kinsale, with his frigate, the *Æolus*, and the frigates *Brilliant* and *Pallas* also under his command, received news on the 24th of Thurôt's invasion, he sailed the same evening, and on the 26th was at the entrance of our bay. On the 28th, he fell in with Thurôt's squadron between Galloway and the Isle of Man, and after a short, but desperate conflict, the three French ships surrendered to the three British ones. The prizes were first taken into Ramsay Bay, from whence the prisoners were dispatched to various places. On the 1st of March, the *Pallas* arrived at Carrickfergus, and landed 15 officers and 216 private men of the French prisoners, who were sent to Belfast. Thurôt, who has always been regarded as the hero of the expedition, was killed early in the engagement; his men hastily stitched up his remains in one of the silk velvet carpets of his cabin and cast him into the sea. For a number of days after the fight, dead bodies came rolling in on the waves between Eggerness and

Burrowhead, on the Galloway shore, to find graves in foreign soil; and, among the rest, were the remains of the gallant Thurôt himself, dressed in full naval uniform, and further recognised by the initials on his linen, and his name engraved in full on the lid of his silver tobacco box. He was laid to rest in the old churchyard of Kirkmaiden, Sir William Maxwell, of Monreith, acting as chief mourner. Mr. Patterson gave a number of particulars concerning Thurôt's parentage and early career, which was chiefly devoted to smuggling. He was of Irish extraction, his grandfather having been Captain Farrell, an officer in the army of King James 2nd. Mr. Patterson concluded by reading several of the ballads which were composed on the subject of Thurôt's affair, including "The Siege of Carrickfergus," "Thurôt and Elliot," "Thurôt's Dream," &c.

On 18th December, Rev. WM. MACILWAINE, D.D., read a paper on "Life."

After some preliminary remarks, the lecturer proceeded to trace, historically, the investigations into the subject of Life in the earliest schools of thought, as preserved in the philosophical systems of ancient Greece and Rome.

In the opposing systems of Heraclitus and Pythagoras, the former reduced nature itself to dream and illusion, while the latter contended that *numbers* constituted the essence of all things. The sublime, but equally imaginative, themes of Plato and Aristotle followed, and continue, even in our own day, to exercise their influence on philosophical inquiry. The various theories respecting the vital principle were then noticed in detail. Fire, light, oxygen, electricity, and galvanism, have been variously esteemed as closely allied to, if not identical with, that principle. All of these are but hypotheses, and none more stable, and certainly not more sublime, than that of the immortal Grecian sage, Plato, who described the world as "an animal with a soul, truly intellectual, and created through the providence of the Deity."

The theory of Lucretius was, that the *animus* or *meus*, the intellectual part of our nature, was distinct from the *anima* or *vita* portion, and this has been generally accepted since his day. The belief that life constitutes a "*materia vitæ diffusa*," was adopted by the celebrated anatomist and physiologist, John Hunter, and has been reproduced in the works of Leuwenhœk, Penault, and others. Leibnitz, Haller, Spallanzani, and Priestly, with other moderns, have adopted, in its essence, the idea of Lucretius, as regards the *semina rerum*, and express their general belief in the existence of various species of organised atoms. The dogma, however, of the "pre-existence of germs" has been annihilated by the still more recent arguments and experiments of the French physicist, M. Flourens.

The lecturer proceeded to remark that all merely imaginary theories had given place to the solid basis of truth, established by the progress of true inductive philosophy, and almost in our own day by the application of the science of *histology*. These had reduced all theories respecting Life into what may be noticed with sufficient distinctness as the *physical* and the *vital* theory.

The process by which the *physical theory of Life* has been arrived at may be thus concisely stated, and in the statement we shall best attain a distinct view of the theory itself.

While the manifest distinction of substances cognizable to our senses into *inorganic* and *organic* remains, a process has been attempted of tracing a continuous line of connexion between inanimate insensate matter, and sentient organized structures; and such attempts, we must acknowledge, have not been made without a measure of at least apparent success.

Thus, the semblance of living and voluntary motion may be noticed in the particles of such minerals as are subjected to the process of crystalization. Chemical and electrical action on many inorganic substances will readily supply to those who are familiar with these departments of physical science, other instances of simulated vital action. When, however, we come to the border region, so to speak, of the mineral and vegetable kingdoms, the chain of connection sought becomes more apparently real. *Carbonic*

acid, water, and ammonia, as science has discovered, which are all forms of inanimate matter, constitute the aliment of plants. Plant life receives its original nutriment from these, and of them or their resultants the parts of the plant from its first germ until it attains maturity are composed. Nitrogen, hydrogen, oxygen, and carbon, are the recognised components of animal tissue.

Vegetable substance constitutes the aliment of the lower animals, and on these again, as well as on vegetable products, the higher forms of animal life, culminating in man, are supported. Thus the continuity of organised being may be traced in its mode of subsistence, and not only so, but in its minute constituent particles. It is at this point of the investigation that modern scientific research exercises its most important influence. The revelations of the higher powers of the microscope make known the astounding fact, that when the remote animal or vegetable tissues are explored to their still more remote component particles, these latter are reducible to one mysterious substance, inconceivably minute to unaided sense; but thus scientifically examined proved to be, so far as such knowledge has yet attained, identical in both cases.

In the discovery of this marvellous molecular substance, thus ascertained to be in a sense the original constituent of all organisms, the science of Life has been placed on a basis of fact never before attained. The chain of organised existence previously traced downward to its inorganic constituents, has now been traced upwards to the limit where matter and spirit, in some sense, would seem to meet. It is in the microscopic examination of this plastic substance that the latest triumphs of biological science have been attained. Within it have been discovered minute cells, proved to be actually living particles, which, under the nutritive influence, as it would seem, of the surrounding bioplasm, go to build up the various portions of the organism which contains them.

Dr. Beale, in his volume on Bioplasm, which has just issued from the press, arrives at a similar conclusion. The following is his statement—p. 6 :—

“First stage of being of every living thing.—Even man and the

higher animals, as well as every other living thing, begins its life as a minute spherical particle, hardly to be distinguished from those minute particles of simple living matters suspended in the air. The particle consists of colourless transparent semi-fluid matter, capable of moving in any part and in all directions. Man and animals, plants, fungi, monads, thus exhibit the same appearances, and the matter of which they consist exhibits similar characters. Each primitive particle was derived from matter like it, which existed before it. It was simply detached from a parent mass."

Dr. Huxley, who may be considered, in this country at least, the leader of the physical school, considers the properties of Protoplasm, and the part which it exercises in the animal kingdom, to be nothing more than *properties of the material* substances in which it is found, exactly parallel to the properties of water and other inorganic substances. This is, in effect, the physical theory, first broached in England at the commencement of the present century, by the justly celebrated Mr. Lawrence, and which has ever since had warm advocates among scientific men. The phenomena of life are, in fact, according to these advocates, properties of matter originating in its most refined, remote, and subtle subdivisions, and manifested in the various acts and habits of the organism through which they are exhibited. To do justice to this theory a great amount of additional statement and quotation would be requisite, which, however, the limits of the present paper necessarily preclude. It cannot be denied that the hypothesis possesses a considerable amount of verisimilitude, and has been supported by arguments exhibiting much ingenuity and plausibility. We are, however, bound, if for no other yet for these very reasons, to give attentive heed to the facts adduced and arguments advanced on the other side, by those who maintain the *vital* theory.

Before stating these arguments in somewhat of detail, it may be remarked that the advocates of the physical theory have, of late especially, manifested a strong tendency to depart from the region of true science and established fact, and to soar into the sublimated and unsatisfactory one of nebulous theory and speculation. Thus, as Dr. Beale remarks ("Life Theories," p. 13)—

“It has been definitely stated, and the statement has been repeated more than once, that the whole ‘world, living and non-living,’ has resulted by ‘the mutual interaction’ of ‘forces possessed by the molecules, of which the primitive nebulousity of the universe was composed.’” And again, Dr. Huxley writes—“It is no less certain that the existing world lay, potentially, in the cosmic vapour; and that a sufficient intelligence could, from a knowledge of the properties of the molecules of that vapour, have predicted, say the state of the Fauna of Britain in 1869, with as much certainty as one can say what will happen to the vapour of the breath in a cold winter’s day.”

The manifest reply to all such statements and their confutation, would be as follows :—that an essential difference exists, and can be shown between bioplasm, admitted to be the nearest discovered ultimate element of organic substances and all inorganic matter whatsoever; and it may safely be asserted that this statement has been triumphantly vindicated by the latest and best qualified expositors of biological science.

If, as the advocates of the physical theory assert, the action and energy of bioplasm be but one of the natural forces, and, in fact, a property of matter, it is highly probable that, in accordance with the now established theory of the correlation of forces, this one would be found identified with some other of these forces. Hence, an interchange between the vital force and such an one as that of heat, or light, or electricity, would be effected, and we should have the results of the former produced by the latter. But all experience, the latest as well as the earliest, goes in a directly opposite direction. No natural agent whatever has been discovered which takes the place of the vital principle.

The following is the concluding portion of the paper as delivered, the portions above given being merely an abstract of the whole :—

“Notwithstanding this, in my judgment at least, overpowering weight of argument and fact on one side of the question under consideration, I feel bound to mention certain views lately advanced on the opposite side, before concluding this paper. In a volume

which has recently issued from the press, its author, Dr. Bastian, thus writes in the preface. His object, he states, is 'to show the general reader more especially that the logical consequences of the now commonly accepted doctrines concerning conservation of energy and the correlation of the vital and physical forces, are wholly favourable to the possibility of the independent origin of living matter.'

"Not having perused this remarkable work, I am not entitled to pronounce independent judgment on either its alleged facts or its conclusions. I may, however, state, that an exceedingly able review of it has appeared in a popular scientific periodical (*The Academy*), by a well-known and accomplished physical scholar, and that the latter utterly dissents from Dr. Bastian's conclusions, and considers his alleged facts and experiments as more than questionable.

"And now, to conclude this necessarily imperfect, though I trust, not altogether unsatisfactory review of the '*Life Theories*' in existence, and of the previous history of this deeply mysterious, yet highly interesting subject, I would do so by expressing the hope that what has been adduced may lead any intelligent inquirer present to adhere to that theory—the *Vital one*—which, to me at least, appears infinitely to be preferred to the opposing hypothesis.

"That theory, while it conducts us to the limit of the mysterious principle, inherited by ourselves in common with its countless possessors on earth, enables us to believe that Life acts upon and differentiates inanimate matter, by means of a force totally distinct from all other discovered forces. Thus, in accordance with the teaching of science, and in entire conformity with its revelations, we have the strongest grounds for believing that this vital principle has been originally communicated to His sentient creatures by the Great Creator Himself."

After the reading of the paper, an interesting discussion took place on the subject, which was taken part in by Mr. J. J. MURPHY, Mr. ROBERT SMITH, and Professor JAMES THOMSON.

Dr. MACILWAINE briefly replied, and the ordinary business having concluded, the members proceeded with the business of

THE PRESENTATION TO MR. WILLIAM GRAY, SENIOR HONORARY
SECRETARY.

[*The following is extracted from the "Belfast News-Letter."*]

The Rev. Dr. MACILWAINE having been called to the chair, expressed the great pleasure he felt in presiding on such an occasion, when the members of the Club were about to do honour to one of the honorary secretaries—(applause)—by presenting him with a token of their esteem and regard. (Applause.) The idea, he might say, originated with Dr. KEOWN, and was taken up with great spirit and cordiality by the members. (Applause.)

Dr. KEOWN, who was received with applause, then explained the circumstances under which the presentation originated. About 113 of the members cordially subscribed, and he might say that far more money might have been obtained had those who got up the presentation desired it. The subscriptions were confined to members of the Club, no application being made to persons outside, though very many would willingly have subscribed had they been permitted. (Hear, hear.) Dr. Keown then read the address, which was beautifully illuminated by Messrs. Marcus Ward & Co., and presented to Mr. Gray in the form of an album, bound with his likeness and a series of photographic views of the places visited by the Club under Mr. Gray's guidance. In addition to the album Mr. Gray received a purse of sovereigns, and a very elegant porcelain centre piece from the Belleek Pottery Works.

Mr. GRAY having replied to the address, and thanked the committee and contributors,

Mr. A. O'D. TAYLOR and Professor JAMES THOMSON bore testimony to the valuable services Mr. Gray had conferred on the Society. Both gentlemen expressed the cordial feelings entertained by the members of the Natural History and Philosophical Society towards the Naturalists' Field Club, as being workers together in the same great cause, and stated that, had they been permitted, the members of the Philosophical Society would gladly have contri-

buted to the presentation—(applause)—as they fully appreciated Mr. Gray's services. (Applause.)

The CHAIRMAN, on behalf of the Club, reciprocated the feelings of friendship expressed towards them by the two members of the Philosophical Society.

On 22nd January, Mr. WILLIAM GRAY gave a description of the celebrated "Flint Jack" and his works.

"Flint Jack" was a Yorkshire dealer in fossils, and he became so expert in cleaning and "doctoring" fossils, he turned his hands to the manufacturing of antiquities. The interest that has been recently excited in pre-historic archæology created a demand for rude flint and other implements, tools, &c., supposed to illustrate the habits and customs of our long-forgotten forefathers; and dealers, particularly "Flint Jack," commenced to manufacture them for the market. Jack was a skilful manipulator of all kinds of articles—beads, arrow-heads, hammers, celts, spears; British, Roman, and Saxon fibulæ; ancient pottery, coins, Roman armour, inscribed stones, and anything else the modern collector required to complete his cabinet. Jack's manufacturing depôt was in the remote valleys of the out-of-the-way cliffs of Yorkshire; here he chipped his flints, "doctored his fossils, and fired his pottery." From this he set out, walking all over the country, north and south, to "do" his patrons, and was as successful in duping the learned professors of Cambridge and Oxford as the simplest village curiosity-fancier. Tradesmen and professionals, gentlemen, proprietors of newspapers and their editors, clergymen and doctors, country squires, and collegiate professors, were his dupes. "Artistic doctors" and "archæological parsons" were his chief patrons in enabling him to scatter his forgeries broadcast; indeed, he states that "no good collection in Britain is without his workmanship." Flint implements and pottery were his chief wares, but he occasionally manufactured a "Roman breastplate" out of a superannuated tea tray; "a silver coin" from an old German-silver spoon; "ancient hammers" from modern paving-stones; "arrow-heads" from rejected beer

bottles. After traversing England he went to Scotland, but he found the Scotch "too canny," and his trip there scarcely paid expenses; not so his trip to Ireland, which is related in the following extract from an account of his life published in the *Malton Messenger*. "He embarked at Liverpool on a Belfast steamer, and at once, on landing, set about duping the curator of the Belfast Museum, to whom he sold some genuine fossils and several forged flint implements—the latter pleased him much. 'He little thought,' says Jack, 'how plentiful genuine flints were in Ireland.' From Belfast he went to Antrim, Ballymena, Ballymoney, and Coleraine, from whence he visited the Giant's Causeway—spending a Sunday there. He returned to Coleraine and went to Londonderry, and made a tour to Strabane, eleven miles up the River Foyle; then to Lough Neagh, Lurgan, Armagh, Monaghan, Drumcondra, Slane, Drogheda, and Swords, after which he reached Dublin. He says he did well, and saw all the best things in the north of the island, traversing it entirely on foot, and was highly interested in the scenery and fine country. He sometimes collected fossils from the mountain limestone, and sometimes made a few flints; sometimes he sold a few, and sometimes found a few genuine ones (particularly about Lough Neagh); but, when he had got fairly in the way of making flints, he had much rather manufacture them than pick up the genuine ones for sale. 'Gathering them was a trouble.' 'Ireland,' says he, 'has many a fine celt and hammer, arrow-head and spear, made by 'Flint Jack.' " In making this statement it is to be feared "Jack" has made a mistake, particularly with reference to the Belfast Museum, for the curator there never purchases things brought for sale, they are referred to the Council. Mr. Gray related several anecdotes, showing how Jack went about "doing" his victims, and concluded by stating that we had in Ireland several manipulators of the "Flint Jack" type. He explained that the English collectors gave such high prices for Irish antiquities, the vilest forgery was passed off as genuine. With reference to this, Mr. Knowles, of Cullybackey, came to the meeting to give some information.

Mr. W. J. KNOWLES then read a paper on "Irish Antiquities and Modern Forgeries." After giving a description of the various kinds of bronze and stone implements, &c., found in Ireland, illustrating his remarks by a large collection of specimens, he explained that Ireland was as rich in genuine antiquities as any country in Europe. That of all the counties in Ireland, Antrim yielded the best things ; and in Antrim, Cullybackey was the best locality for procuring good, genuine articles. He explained that the increased demand for Irish antiquities, and the absurdly high prices paid by English collectors to any dealers, was most damaging to all fair dealing, because it tempted many dishonest men to manufacture what they could not otherwise procure, and so freely was the manufacturing business carried on, that large quantities of vile fabrications were scattered all over the country. "Beads" were readily made from the lithomarge of the trap rocks; "bronze pins" were manipulated out of the common brass wire; "fibulæ" of every possible design were produced from the worn-out ornaments of carriage-harness, old shoe-buckles, &c.; and recently a very large supply of bronze swords, knives, daggers, &c., were made from sheet brass, beaten out into the most fantastic forms; and formidable "clubs" and "war-hatchets" were made from the mica slate of County Derry. Yet all these absurd fabrications were sold, and brought extravagant prices; beads realised 5s. each, swords 10s. to 20s. each, and "clubs" from 10s. to 30s. ! Mr. Knowles warned collectors to be on their guard, and not to encourage this absurd traffic.

A discussion followed, in which Messrs. Patterson, Gray, Wright, and Hodges took part; and after the works of "Flint Jack," exhibited by Mr. Gray, and the "genuine" and "forged" antiquities exhibited by Mr. Knowles were examined, the meeting separated.

On February 12th, Rev. EDMUND M'CLURE read the following paper on "Family Names as indicative of the distribution of Races in Ireland."

"What's in a name?" said the great dramatist, intending to

show the worthlessness of words taken in themselves—of words apart from the things represented by them. What's in a name, we may ask in quite a different spirit, and expecting quite a different answer. For we know what Shakespeare did not—we know that words have an independent meaning—that in themselves, without considering the things they represent, there is much knowledge bound up. Philology was unknown, as a science at least, in the time of the great poet. Indeed it is only comparatively lately that it has attained a position among the sciences. But it has done so; and now it invests language with quite a new interest. There is not a word in any language which has not now a history, sometimes a romance about it; and Philology teaches us how to find out this history,—how to analyse words,—how to trace their constituents away back into the remote past, and to connect them with scenes and events, with manners, and customs, and languages, which belong to the earliest periods of the human race. This is true of all words. It is as true of all those appellations by which men have distinguished themselves, from the earliest times, as it is of any word to be found in a dictionary. For there is no personal name which has not, or had not, a signification. The name which any one of us may bear, not only determines our relation to certain individuals who have borne it before us, but it contains, if we were only wise enough to see it, a wonderful history of times and of men long passed away. There is much in a name, indeed. The history of people whose deeds are not recorded in the annals of the world is bound up and often to be read in the names they bear. We must not look upon personal, I should say family names, as having no other significance for us than that of distinguishing one set of people from another. In many cases they do a great deal more than this—they contain the family history; they tell us of the race, the tribe, the people from whom those who bear them were descended; they speak often of wars and invasions; they tell often of oppression and slavery, of which the present generation may have now no memory. They do all this, and more than this. I need not here give any instances, as we shall have numerous examples further on. As a preliminary

study to that of the significance of personal names, comparative Philology must always occupy the highest place. Comparative Philology, which exhibits to us the great families of languages, and shows to us their mutual relations ; and comparative Philology, in regard at least to the languages of ancient and modern Europe, has already done a great deal for us. It has shown how that all the important languages of Europe have had one common parentage—that they are brothers, and sisters, and cousins, and relations of all kinds. It has traced not only the chief languages of Europe to one common parent, but the languages of ancient Persia, and of ancient and of much of modern India, to the same great stem. And this family, embracing the chief languages of Europe on the one hand, and of India on the other, is known by the name of the Indo-European family. So, however much we talk of the superiority of Saxon over Celt, or of Celt over Saxon ; however much we may insist on the pre-eminence of the Gothic over Slavonic, or over Indian races ; we must remember, that they are still like the languages which they employ—of one parentage—of one blood in the last analysis. The Indo-European family of languages embraces the Sanskrit, or ancient language of India, and its modern derivatives ; the ancient Greek and Latin (and their modern representatives, the Romaic, the Italian, Spanish, French, &c.), the Slavonic, Gothic, Celtic, Zend, and Lithuanian. Well, then, these various families of languages, all belonging to the same common stock, indicate the various families into which the parent race has been divided. They show that certain varying circumstances, such as climate, geographical position, the nature of the soil, and many other external influences, have been at work for centuries, in modifying the tongue and disposition of these blood relations, and in making them almost as different from each other in character as they are in language. For, the same influences which modify speech, tend also to modify the general character—the tone of thought as well as the expression of thought. And thus people who originally spoke the one language, and were in general of one disposition, have become, by being placed under different physical circumstances, very different in speech, and very different in

character ; and this difference it is, when very great, which causes distinctions of race ; and once the distinction of race becomes recognized, it is more or less permanent ; it tends to perpetuate itself. And if there were no fusion or intercourse between peoples thus distinguished, their divergence from each other both in language and character would, in all probability, go on increasing. But if such distinct races were in any way, by the fortune of war or conquest, say, to become blended, then the languages of the weaker or of the less numerous would run danger of being altogether supplanted by that of the stronger or of the greater number. And if no record or memory of such fusion of races were preserved, it would be very difficult to determine, from the spoken language, at least, whether this had occurred or not. For instance, ancient France or Gaul was inhabited by a Celtic speaking people. The Roman conquest of the country brought with it Roman colonists and the Roman language, which absorbed and supplanted the existing Celtic speech and civilization. Again, this country of Gaul when it had become a Romance talking nation, was invaded and conquered by a Gothic tribe, using quite a distinct speech. Yet that Gothic tribe, although it had been superior in arms, was inferior in numbers to the Romance talking inhabitants, and the language of the Gothic invaders had finally to yield to that of the conquered. And so Ireland was, at least a few centuries ago, inhabited by a Celtic talking people ; but being invaded and conquered by a branch of the Gothic family, it has gradually seen its ancient speech die away before that of the conqueror. So that all the different races in this island are not now distinguished by a difference in speech.

The Celt, the Dane, the Saxon, the Norman, and settlers from France and other parts of Europe, are now all indistinguishable from each other in this land by their speech. The original speech of all of them has been supplanted, except in a few outlying districts where Irish is still spoken, by the one English tongue. And so it would appear that the existing language can give us no indication here of the distinct races which inhabit this island ; and the science of Philology would seem useless when applied to solve the

question of the distribution of races among us. But this is only *seemingly* the case. For Philology can tell us a great deal about this matter ; although the languages of the conquered and of many other races in Ireland, may have given place in the main to one predominant tongue, yet we have still some linguistic relics, few in many cases it is true, which testify to a variety of race under a community of language in our country. Men may lose their *language* ; they do not so readily lose their *names*. The family names existing in the country are the relics of distinctions of race and language, which in many cases could not be proved to exist in any other way. In fact, from the existing names of people alone in this country, one might build up a general history of the island. The Post Office Directories in the hands of a good philologist might furnish us, if all other records were lost, with an authentic history of our land. You know what Geology has done towards determining the early history of this earth of ours ; you know how, from the fossils of the different strata, it can determine the relative ages of the many layers which encrust the globe. Well, Philology has a similar work in a social respect, and uses similar means to accomplish it. Sometimes its materials are very abundant ; sometimes it has a great part, if not the whole, of a language—a perfect mine of philological fossils—to determine the age of a speech, and the civilization of those who used it ; sometimes it has only a few words—a few personal names for instance—a few scattered word-fossils, to find out the great social strata to which they belong, and to determine their relative place and age in the world's history. But in any case it can employ those materials in contributing to or in confirming the existing annals of the human race. And this is the purpose to which I propose to apply it this evening ; and that, too, in reference to the history of our own island, which ought to be dear to every Irishman. Ireland has been exposed from the very earliest times to invasions. Whether drawn by its beauty, or its climate, or its rich soil, the adventurous have sought a home in it from the very dawn of history. The record of the earliest invasions, as preserved in our most authentic annals, is of the most meagre description. We have merely the bare statement that such

and such a people invaded Ireland at such a time, and then a meagre list of the names of the invaders. If these names were authentic, we might determine the nationality of the early invaders of the country, and thus fill up a large blank in its primitive history. We might then tell who were the Milesians, the Partholarians, the Fomorian, and Tuatha de Danaans, of whom we read in the early annals of our country. Something in this way may be done even with the meagre materials at hand, but I am not in a position to-night to attempt it. I shall leave that portion of the history for some future occasion.

One thing we are quite sure of, that this country was possessed at a very early period by a Celtic speaking people; by part of a great and conquering nation, first noticed in history as thronging into the valleys of the Danube, thence flooding Gaul, breaking into Greece and Italy; spreading from Gaul northward, and occupying the British Islands. We have the evidence of authentic history for this; we have also confirmative evidence from Philology. Although of the language of the Celts on the continent, we possess but a few names of chiefs preserved in the histories of Cæsar, Tacitus, and Livy, and in some ancient inscriptions. Yet those names are quite sufficient to show us that they belonged to people using a cognate language with that spoken by the early inhabitants of this country. You will readily recall to memory the names of those Celtic chieftains noticed by Cæsar and Tacitus, such as Ambiorix, Dumnorix, Orgetorix, Cingetorix, Vercingetorix. Well, these are all Celtic names, and contain roots to be recognized for the most part at the present day. You see here a common termination *rix*; well, this is the Celtic Righ, which means chief or king, and which is compounded with many similar words in Irish, Welsh, and Armorican. You see here the prefix *ver*; well, this means simply man—the Irish *Fear*—and is found combined with many Irish names. You will remember the name of the British chief noticed by Tacitus—Caractacus. Well, this name has been found in old inscriptions on the continent, and it still survives in names which are more familiar to your ears. The present Welsh form of it is Caradoc, or Caradwg; the ancient Irish Cartach, or Carthaigh;

and the modern form Carty, in Mac Carty. All these words have a common root—*cara*—which means friend ; a word very much used in ancient names, and still surviving in many. We see it used in this sense in by no means an uncommon name amongst us—Car Michael, which simply means the friend of Michael (the archangel). There were many ancient names compounded out of the Celtic word *Cobh*, which signifies victory ; old Gallic inscriptions preserve it in such names as Cobnertus, Coblauon. The old form of O'Connor was *O'-Con-Cobhair* ; Con signifying strength, and the root Cobh—victory. We have, too, in the old Irish Annals, such names as *Cob-flaith* (victorious prince), *Cob-haill*, &c. Another Gallic name preserved in inscriptions is *Corbeus* ; well, this means simply charioteer, and is preserved in many Irish names—in none more distinguished than that of Mac Cormac (Corb-mac), which is translated in the old glossaries, “ Son of the chariot ”—*Corb* meaning chariot. These are but a few out of the many instances which might be adduced from the names of persons, to show that a great part of western Europe, Ireland included, was inhabited at one time by a Celtic speaking people.

Now, let us consider for a few moments how the Celts—and particularly the Irish Celts—were accustomed to impose personal names. In the earliest accounts of the social condition of the Irish, and from a very ancient code of Irish laws which still exists, it would appear that ancient Irish society was founded upon the tribal system. Each tribe of the people was originally but a single family, which, in the process of time, multiplied until it embraced many members and became a powerful sept. The tribes, which were originally perfectly independent of each other, occupied separate territories—each tribe possessing about the area of a modern barony. Although every tribe had its own chief or Righ, there arose among them a certain subordination to the Righ or chief of the predominant sept. There was often considerable contention among the more powerful tribes for this pre-eminence. The descendants of the celebrated Niall of the Nine Hostages held this honoured position for ages. Each tribe was distinguished by a clan name, which was formed by prefixing to the name of the progenitor of the tribe any of the following words :—

- 1.—*Cinel*. Kindred, race; as Cinel Eoghain, the race of Eoghan.
- 2.—*Clann*. Children, race; as Clann Colmain.
- 3.—*Corc, Corca*. Race, progeny; as Corca Duibhne.
- 4.—*Dal*. Tribe, progeny; as Dal Riada, Dal Araidhe.
- 5.—*Muintir*. Family; as Muintir Maoilmordha.
- 6.—*Síol*. Seed; as Síol Maoluidhir, preserved in the name of the territory of Shelmalier, Co. Wexford.
- 7.—*Tealach*. Family; as Tealach Dunchada.
- 8.—*Sliocht*. Progeny; as Sliocht Aedha Slaine.
- 9.—*Ua*. Grandson, plural *Ui*; as O'Nial, *Ui Neill*.
- 10.—*Mac*. Son; as Mac Cartach, &c., &c.

Besides these prefixes there are other words to be found, especially before the names of territories, which have similar significations, as *aes*, people; *fir*, men; *aicme*, tribe; *pobul*, people; e.g., *Aes Greine*, *Fir Reis*, *Fir Arda*, &c. Many other Irish names of tribes are formed by the addition of terminations, such as *raighe*, *aighe*, *ne*, *acht*, to the cognomens of their ancestors, as *Caenraighe*, *Muscraighe*, *Mairtine*, *Conmaicne*, *Cianacht*, *Eoghanacht*. These are the usual forms of the tribe names among the Attacotic families enumerated in the Books of Lecan and Leinster.

We find, also, that it was customary to form surnames by prefixing the words *Giolla* or *Maol*, both signifying servant, to the names of saints, &c. We have, for instance, *Giolla Patrick* (now Gilpatrick or Kilpatrick), *Gil Christ* (the servant of Christ), *Gil Kieran*, *Gil Colum*, *Gilmour* (servant of Mary), *Gil Rea*, *Gil Aspucke* (now Gillespie), servant of the bishop. Thus, also, we have *Mul Christ* (servant of Christ), *Mul Patrick*, *Mul Kieran*, *Mul Colum* (to be recognised in the various forms, *Mulchallyn*, *Mulholland*, *Malcolm*, all meaning the servant of St. Columba). Names like Mac Ilroy, Mac Ilwaine, Mac Ilveen, Mac Ilwrath, are corrupted forms of *Mac Gilroy*, *Mac Gilwaine*, *Mac Gilwrath*, &c.

In addition to the clan name, the chief of each tribe had generally a distinct appellation. The name of his father, and sometimes that of his grandfather, was prefixed to his own, e.g., *Lughair Mac Lughaidh*. Previous to the time of Brian Boru in the 10th century this was the custom in name-giving. You will observe from this that the tribe name was the only permanent one—and that the name used by the chief changed with each changing

generation. About Brian's time permanent surnames began to be introduced. These surnames were taken in the first instance from some distinguished ancestor, and then became the distinctive and permanent appellations of the descendants of those who first assumed them. Thus Irish family or surnames are formed from the genitive case of names of ancestors who flourished in the 10th century, or thereabouts, by prefixing O or Mac—O, meaning grandson, and Mac, meaning son—compare the Welsh Map, changed to Ap and 'P, and the Norman Fitz—fils, filius—and the Gothic son. (Ni was used for daughter.) Now this was the state of things which we find to have existed in Ireland shortly after a very serious event for the country—the invasion of the Norsemen. In the 8th century bodies of Norse rovers, history tells us, were to be found hovering around the coasts of south-western Europe, and now and again making successful descents for the purpose of carrying away booty. Ireland, along with England, France, and other countries, was exposed to the attacks of these sea rovers. The first record of a Norse attack on this country is set down in the Annals of Ireland opposite the year 795 A.D., when Scandinavian pirates made a descent upon the island of Rachrein or Rechru (conjectured to be Lambay island), and burned and pillaged its churches. From this time forward, until the arrival of the Anglo-Normans, in the 12th century, Ireland was subject to the continuous ravages of Norwegian and Danish pirates and adventurers. These Norsemen finally won a footing on the island, and established themselves as regular occupants of the soil. They founded several seaports whose names still indicate their origin, as, for instance, Wexford, *i.e.*, West-bay; Waterford, *i.e.*, Weather-bay. They occupied many other places on the sea-board, and even in the interior of the country. The names of Howth, Skerries, Leixlip (*i.e.* Salmon leap), Strangford, Carlingford, &c., all show by their Norse origin the influence which these invaders had on the country. Even in the very heart of Ireland their kings held their courts for many years. Turgesius, for instance, had his royal residence at Armagh for some time. Although these men had very fierce wars with the native Irish, they occasionally entered into covenants with them, and by

intermarriages became in some places after a manner Hibernicised. At the time of Brian Boru many Norse chiefs were allied by marriage with Irish families. Sigtrygg, king of the Danes of Dublin, was married to a daughter of Brian. Brian himself was married to a Danish woman—Kormlada.

The influence of the Norse occupation, and of these intermarriages, may still be seen in the family names which we encounter from this date forward until the present. Thus, it is no uncommon thing from this time to find Norse names combined with Celtic. A few instances will suffice here. Thus, we find affixed to the Celtic *Mac* (meaning son), Ivar or Ivor, an ancient Norse appellation. The common form of this name at present is Mac Keever or M' Ivor. There is an early Celtic name, Emher or Ever, not to be confounded with this. MacLoughlin or MacLachlan is in all probability a Danish name; *Lochlainn* being the word used by the ancient Irish to designate the Norsemen, as *Lochlann* was employed to signify their country. MacAuley or M'Cauley and M'Auliffe, are all for the most part Norse names,* being modified forms of the Scandinavian Olaf, which appears in the form *Amlaoibh*, as a name of one of the Danish kings. There is a St. Olave's church still in Waterford, and many churches are to be found in Norway, and even in the parts of England subject to Danish influences, dedicated to the same saint. The Irish name Reynolds, a corruption of Mac Rannalls, is most probably Danish. The name first appears in the Irish Annals in the form *Ragnaill*; a little before the Norman conquest, Reginald, a king of the Danes of Waterford, is mentioned in the Annals. The Norse form is *Ragnvald*. In the pedigree of the Mac Rannalls there are many Ivars, which fact strengthens the assumption of their Norse origin. There are several families, too, who came originally from Scotland, whose names show that they are of Norse origin, or have been subject to Norse influences. For instance, we have the family of the Mac Donnells of Antrim, whose history is about to be published shortly by one of our distinguished archæologists, the Rev. George

* There are also Celtic MacAwlys, descended from Amhalgaidh, son of Fiachra.

Hill, of the Queen's College. They came from Scotland to the north of Ireland about the 14th century. That they were subject to Danish influence before their arrival here cannot be doubted. Their ancestor was Lord of the Isles of Scotland, and the inhabitants of these very isles were at one time half Norse, a circumstance that would readily explain a Danish infusion, and this is borne out by a favourite name in use among the family here until comparatively recent times—the name Sorley—you have heard of Mac Sorley boy M'Donnell, or the son of Yellow Sorley; well, here both the yellow hair and the name Sorley point to a Scandinavian origin. Sorley is a form of the Norse Somerled. In the pedigree of the Mac Donalds, Lords of the Isles, there are many Danish names—*e.g.*, Olaus or Olavus, Reginald or Ronald, Somerled, &c. There, too, were the Mac Cabes, anciently Mac Caba, of the north of Ireland, who were of the M'Leoids of Arran—they, too, it would appear, were of Norse origin, or Norse connection. The late Dr. O'Donovan maintained this, shewing on the authority of Mac Firbis, that the Mac Cabes were descended from old Ivor, as he was called, the ancestor of the Danish kings of Dublin, through the Mac Leoids. One of their ancestors was Magnus, the Norse king, and the names Laughlin and Sorley are found in their pedigree. The Mac Sweeneys of Donegal, too, if we are to trust Dr. O'Donovan's statement that they came over from Scotland to be gallowglasses to the O'Rourkes, O'Reillys, or Mac Mahons, appear to be of Danish origin. The name is decidedly suspicious, being as nearly as possible the common Norse name Sweynson. There is, too, no mention of the Mac Sweeneys in the Annals of the Four Masters before the year 1267.

Mac Firbis, who was a great transcriber of Irish annals, and who flourished about 1643, tells of three other clans (in Scotland) who were Lochlainns, *i.e.*, Norsemen—the Clanna Orca, the Clanna Cruiner, and the Clanna Thorkadail. The latter is probably to be identified with a common Scotch name, still to be found here among the descendants of the Scotch settlers, under the forms Turtle or Thirkild, as it was a few years ago, and Threlkeld or Threkild. The name Costello, O'Donovan conjectures to be of

Scandinavian origin. Thus much for the testimony of family names to Scandinavian influences upon the Irish, and to the existence of a Norse element in the country.

The next influence brought to bear upon Ireland was through the Norman invaders. You know the story, how that Dermot Mac Morrough, king of Leinster, being expelled from his chieftaincy, went to England to seek the aid of King Henry II. How after some mishaps he finally induced a number of Norman adventurers to return with him, and to attempt the recovery of his kingdom. This was the Norman invasion—it took place in the year 1170, when, on the 1st of May, a number of mixed Welsh and Norman knights and 600 soldiers landed near Wexford. The names of the principal of these knights are important, as they played a distinguished part in the history of Ireland in after years. There were three Fitz Henries, two de Cogans, two de Barrys, three Fitz Geraldts, Raymond le Gros, Landsdowne, Petty and Henry de Montmaurice, Maurice de Prendergast, Robert de Bermingham, de Lacy, Tirrel, Welsh, Verdon, de Courcy, and last, but not least, Richard de Strigul, or Strongbow. Many of the names of those who took part in this invasion are still to be found in the Peerage of Ireland; the present Baron Kingsale is a descendant of the great John de Courcy, Earl of Ulster.

After some time these invaders succeeded in obtaining a hold upon the country. The eastern coast, from the Boyne to Wexford, was first reduced, and the Danish inhabitants of many of the seaports, though at first inimical, became the allies of their recently arrived kinsmen; for you must remember that the Normans were, as their name implies, of Norse origin. Ireland was divided into portions, and granted by the king to the invaders; Meath was given to de Lacy, who had to dispossess the original possessors, the O'Rorkes, before he could enter upon his new property. Richard Strongbow obtained the lordship of Leinster, as well through marriage with King Dermot's daughter as by the grant of the king of England. The lordship of Ulster, comprising then about the one-sixth of the entire island,

was granted to John de Courcy : the large district of Cork was granted to Miles de Cogan and Robert Fitz Stephens ; Connaught was given to William de Burgo. The territory of the de Lacys finally, through marriage and descent, became the property of the Duke of York, and finally vested in the Crown. The earldom of Leinster, through fault of male issue, became the property of several persons, some of whose descendants, as the present Viscount de Vesci, still live. The lordship of Ulster, granted to Hugh de Lacy on the attainder of de Courcy, passed by inheritance into the hands of the de Burgos, and finally through Richard, Duke of York, merged into the Crown. Connaught became also vested in the Crown through inheritance. The kingdom of Cork ultimately formed the great estates of the southern or Desmond Geraldines (Fitz Gerald's).

The great grantees of the Crown in their turn re-granted the lands under certain conditions to subordinate vassals, and thus a great portion of the country was brought under Norman rule. But the remarkable point in this conquest was that the Celtic population was not driven back upon any one portion of the kingdom, but remained as it was, interpolated among the new arrivals. The distribution of the two populations was much as follows—the Normans occupied, in considerable force, the counties of Antrim and Down in Ulster ; in Leinster the counties of Louth, Meath, Dublin, Kildare, and the greater portion of Westmeath. They held, also, the King's and Queen's Counties, Carlow, Kilkenny, Wexford, the eastern part of Tipperary, and the eastern part of Munster. They occupied Limerick and the adjoining district. In Connaught the de Burgos held sway.

On the other hand, the residue of Ulster was occupied by the O'Neills, O'Donels, O'Farrells, O'Reillys, and O'Rorkes, and subordinate tribes. The Irish, however, although thus interpolated, possessed no definite legal rights, and were looked upon still as alien ; with the exception of the five bloods, as they were called, none of the Irish septs enjoyed the privilege of English law, these were The O'Neill, O'Molaghlín, O'Connor, O'Brien, and Mac Murrough. We find from this time forth names of Saxon and

Norman origin abundantly throughout Ireland. In Ulster the new names were confined chiefly to the counties of Antrim and Down. In an act of attainder of Shane O'Neill, passed in the eleventh year of Queen Elizabeth, there appears the following clause in relation to the English inhabitants of this part of Ulster: "John de Corsie, sent into Ulster by Henry II., first won the citie of Down, and then all Ulster, of whose companions in arms there remaineth at this day in Ulster, as a testimonie of that conquest, certayne stirpes of English blood, as the Sauvages, Jordans, Fitzsimons, Chamberlins, Bensons, Russells, Audeleyes, Whytes, and many others, as propriatories of large portions of land." And an old map of Carrickfergus, of the year 1550, given by M'Skimmin in his history of that place, shows us the houses of persons of the following names—Sindall, Dobbyn, Stevenson, Russell, Wylles, Savage; these were doubtless the names of Anglo-Norman families in the main who had survived from the conquest. In a general pardon granted to some of the inhabitants of the counties of Down and Antrim, in the first year of James I., I find the English names of Brooke, Jenocke, Savage, Woodes, Wallis, Lynn, Eustace, and Rives, M'Varnocke or Varnick, Spratt, numerous Russells and Savages, and Fitzsimons; these were no doubt in the country before the wars conducted by Essex. The names St. Ledger, Parker, Piers, Aunershop, appear as landholders in Down and Antrim during the reign of Edward III. There was a constant arrival of fresh adventurers from England for some time after the conquest, and the English influence increased very steadily in the island; but, about the beginning of the 14th century, owing to a variety of circumstances, it began sensibly to wane, and was literally shattered to pieces by the Scotch invasion under Bruce in 1315. Edward Bruce landed near Carrickfergus in 1315 with 6,000 men. He found Ulster then in the possession of the great de Burgo, known as the Red Earl. Bruce defeated him in two battles, and pushed his conquests as far as Limerick, endeavouring to extirpate the Anglo-Norman colony everywhere. He, however, was finally defeated by de Bermingham, near Dundalk, and slain—the mass of his army, it would appear, escaping to Scotland.

The English influence, however, continued sensibly to fail. In 1333 a large portion of Ireland was suddenly lost to them, many of the chief Norman houses utterly renounced all allegiance to England, and combined with the Irish clans. They adopted henceforward the Irish language, apparel, and laws. On the banks of the Shannon, for instance, in sight of the royal garrison of Áthlone, the two great de Burgos, ancestors respectively of the Earls of Clanrickarde and Mayo, stripped themselves of their Norman dress and arms, and assumed the saffron robes of Celtic chieftains; Sir Edmund de Burgo assuming the title of Mac William Iochtar (*i.e.*, the upper), and Sir William de Burgo that of Mac William Uachtar (*i.e.*, the lower). At the same time eastern Ulster was lost to the English crown. The sept of the O'Neills, known as Clan Aedha Buidhe (or Yellow Hugh's clan), crossed the Bann, expelled the settlers spared in Bruce's invasion, and established for themselves a principality known as Clannaboye. The only place still occupied by English, even as late as the 16th century, was the castle and neighbourhood of Carrickfergus; all the rest of Antrim, formerly the residence of the great Earls of Ulster, was occupied by a compact Celtic population, which offered a protracted resistance to all further attempts at English colonisation. The English influence became, from the 14th century forward for some time, confined to the Pale, stretching at this period not farther north of Dublin than Dundalk; and southwards, but a very little way; it was likewise of very meagre breadth. Even here it was necessary to restrain the English from forming connections with the native Celts, and most stringent laws were passed for that purpose. Not only was it forbidden for the English to use the Irish language, mode of naming, and apparel, but an act was passed in the fifth year of Edward IV. (1465), "That every Irishman that dwelleth among Englishmen, shall take to him an English surname of one town, as Sutton, Chester, Trym, Skryne, Corke, Kinsale; or colour, as White, Blacke, Browne; or art or science, as Smith, or Carpenter; or office, as Cooke, Butler; that he and his issue shall use this name." Before this, a futile attempt had been made by Richard II. to subdue the country; but, from the time his army was re-

called to meet troubles in England, until the thirty-ninth year of Queen Elizabeth, there was no attempt made to subdue the Irish ; but all their efforts were absorbed in defending the English border. The attempt to enforce an imposition of English names upon the Irish within the Pale must have been in a great measure futile, for we find Spencer a century afterwards recommending a re-enactment of this law. We are not, however, to suppose that English influences on the names of the Irish were not felt. The junction, by intermarriage and otherwise, between the Anglo-Norman colonists and the native Irish made itself felt in this respect in a reciprocal manner. Anglo-Norman names like Hugh, Wilham, Walter, Morris, Gerald, Edmund, Henry, Richard, &c., as well as the Norman prefix Fitz, became common among the Irish septs, and so also did Irish names become usual among the Anglo-Normans, for as we are told the latter became *hibernis ipsis hiberniores*. Thus, the Mac Davids, Mac Philbins, Mac Shoneens (now Jennings), and Mac Gibbons, were all Norman families, and so also were the Mac Feioris (who was a Bermingham), Mac Aveelys (descendants of Milo Stanton), the Mac Wattins (Burrets), Mac Jordan (D'Exeters), Mac Thomas (Fitzgeralds), Mac Pierce (Butlers), Mac Adam (Barrys), Mac Shere (Poers or Powers), Mac Ruddey (Fitzsimons), Mac Falrene (Wesleys), Mac Maurice (Prendergasts). It would appear that the celebrated M'Quillans* of the Route even were of English or Welsh origin. Mac Firbis, the great transcriber of Irish annals, says that they came into Ireland at the time of the English invasion. He would, however, make them and the Barretts and others originally of Irish origin. At the beginning of the 16th century they are described by English writers as among the leading English rebels in Ulster, the others being the Bissetts and the Savages. Saintleger, writing to Henry VIII., in 1542, talks of meeting with "one Maguyllen, who, having long strayed from the nature of his allegiance (his ancestors being your subjects, and came out of Wales), was growne to be as Irishe as the worste." The Lord Lieutenant writes to the king

* See Reeves' Antiquities, pp. 326, 327.

the same year, and speaks of Maguyllen as an Englishman. In the Dublin Council Book, under 1541, we find "the submission of Maguyllen, who desireth to be reputed as an Englishman, as his ancestors were." It is worthy of remark also, that the Christian names of some of the Mac Quillans were Nerman—*e.g.*, Jenico, Mac Gerald, Mac Cuyllen. Shane O'Neill, too, in writing to Queen Elizabeth, speaks of Mac Guillen as a "mere Englishman." It is worthy of note that there is no mention of a M'Quillin in the Annals of the Four Masters before the year 1310. O'Donovan supposed that the name was a corruption of Llewellyn; it is possible that the name is simply Mac William, assumed in Ireland by some of the chiefs who accompanied Strongbow. There is one thing certain, as O'Donovan tells us, that there is not a single instance on record of any Anglo-Norman family having taken any Irish names, except such as they formed from the names and titles of their own ancestors, by prefixing Mac in place of Fitz—*e.g.*, Mac Maurice, Mac Gibbon. It is equally certain that Irish names were very generally assimilated to the English in the Pale and its vicinity, whether on account of the above mentioned law, or on account of the social ban upon all whose name, or language, or dress showed them to be *mere* Irish; and from this it may be inferred, that many families bearing English surnames throughout the Pale, are of undoubted Irish or Danish origin. We have authentic instances of this; thus, Harris mentions the Shannaghs (which means fox), having changed their name to Fox, and the Gowans (gowan meaning smith), to Smith; thus, Mac Intire—son of the carpenter, became Carpenter; Mac Spallane, Spenser; Mac Killy, became Cock; and Mac Cogry, or Kegry, L'Estrange; O'Mulclohy (in Sligo), has been mistranslated into Stone; Mac Connava has been rendered Forde; O'Cnavin has become Bowen (Bone). In Tyrone, Mac Rory is rendered invariably Rogers; Mac Conry is made King. Besides those changes which were made in accordance with the seeming meaning of the words, there were others made from a resemblance of sound; for instance, Mac Laighed was changed into Leigh; O'Duinne into Doyne; Mac Crossan into Crosbie; O'Conner into Conyers; O'Reilly into

Ridley ; O'Donnel into Daniel ; O'Sullivan into Silvan and Silvers ; Mac Carty into Carter ; Mac Mahon is rendered Matthews ; Mac Cawell is Anglicised Campbell, or Howell, or even Caulfield ; O'Heraghty has been in some places changed into Harrington ; O'Shaughnessey is changed in Limerick into Sandys ; O'Brollaghan is made Bradley ; in Leitrim, O'Fergus has become Ferguson ; in Ulster generally Mac Teige has become Montague ; O'Molloghan has been changed to Molyneux ; O'Cairellan to Carleton ; Mac Shane to Johnston ; O'Gneeve to Agnew ; Mac Riabghaid, a clan name in Fermanagh, successively into M'Areavy, M'Greavy, and Gray ; O'Linchy to Lynch ; Mac Rannal, in Connaught, is changed to Reynolds ; O'Mulfover to Milford ; Mac Firis to Forbes ; O'Sesnan, in Munster, is changed to Sexton ; O'Sewill to Walker ; Mac Reachtagain to Rafter ; Mac Dunley to Dunlop ; O'Dorcy has been changed into the Anglo-Norman Darcy ; O'Mullaville has been made Lavelle in Connaught, and in Ulster into Mac Paul ; O'Dubhlaine is made Delaney. These changes in many cases may be simply the result of a natural process. We have many instances of Scotch and Welsh names being similarly metamorphosed ; for instance, the Welsh names, Ap John into Jones ; Ap Richard into Uprichard and Pritchard ; Ap Robert into Probert and Roberts ; Ap Gwilliam into Williams ; Ap Rody into Brody ; Ap Hugh into Pugh. The Scotch names—M'Cooke into Cooke ; M'Hendry into Henry ; Mac Gregor into Greer and Grierson. An act of 1693 forbade on pain of death the clan Mac Gregor from calling themselves by their name. These changes, arising from whatever cause, render the investigation of the distribution of races in Ireland from the existing surnames a very difficult problem.

There was no great attempt to subjugate Ireland, as I said before, from the time of Richard II. until the 39th year of Elizabeth's reign. It was then that Devereux, Earl of Essex, was sent into Ireland, and it was then that another effort was made to colonise the country. The expedition of Essex was a comparative failure, yet some of the officers engaged in this campaign became important men when the plantation of Ulster was begun in

earnest, in the early part of the reign of James I. In the last years of the 16th century we find the following distinguished names:—Sir A. Chichester, Sir Foulke Conway, founder of the house of Hertford; John Skeffington, who married a daughter of Sir Hugh Clotworthy, of Muckamore, County Antrim, and from whom the peerage of Massereene has descended; Captain Norton, who built Castle Robin; Captain Egerton, Captain Langford, Sir Hercules Langford, Lyndon, Savage, Piers, Dobbin, Dalway, Sendall, Rice, Harper, Wills, Captain Moyses Hill (ancestor of the Marquis of Downshire), Floyd, Wood, Rice ap Hughe, John Thomas Hibbotts, Sir James Hamilton, Sir Faithful Fortescue, Sir Hugh Montgomerie. There are representatives of many of these families in these counties at this day. The most of them obtained large grants of land at the plantation of Ulster in 1609, and planted them with English, Scotch, and Welsh settlers. Sir Foulke Conway obtained what is now known as the Hertford estate, which he seemed to have planted in the main with Englishmen; the names existing on the best part of that estate, in Ballinderry and neighbourhood, at the beginning of this century, were mostly English—Higginson, Walkington, Davis, Sefton, Hunter, Cinnamond, Casmont, Patterson, Harrison, Hasty, Strane, White, Oakman, Gregg, Garrett, Young-husband, Hall, Waring, Whittle, Clement, Hull, Watson, Chapman, &c. In the same neighbourhood is Brookhill, called after Sir Francis Brook, a colonel in Elizabeth's army. About Lambeg were some Welsh names—Aprichard, Gwilliams, and also many English—Gresham, Hastings, Waring, Close, Blizzard, Wheeler, Braithwait, Barnsley, Carleton, Bennett, Waters, Shillington, Hammond, Moore, Richardson, Hopes, Lamb, Peel, Bicket, Carter, &c. The bulk of the settlers in the Ards and north-west part of Antrim were Scotch. In the Patent Rolls there are lists of many such who became naturalized, including the names of Edmundson, Haldan, Boswell, Dunlop, Macnaghten, Kennedy, Shaw, Blair, Benthill, Logan, Dick, Paton, Lynne, Lindsay, Kyle, Moncrief, Conyngham, M'Neill, Young, Colville, Love, Gibson, Somervell, Hall, Rankin, Thompson, Crichton, Smith, Habucke, Cooper, &c. There are also enrolments in the same documents of the

naturalization of Dutchmen and Flemings during the same reign. We have the names of Verhoven, Wybran, Olpherston, Van Dale, De la Hase, Derenzie, Boell, &c. The plantation was successfully carried out over Ulster, and has helped to make it what it is to-day.

After the rebellion of 1641 many estates were confiscated, and distributed among the soldiers of the Commonwealth, and among adventurers who had subscribed for the reduction of the kingdom. The soldiers sold their grants in the main, but many of them and of the adventurers, chiefly English, settled in the country. I find over 2,000 claims for land, made by the soldiers and adventurers engaged in suppressing the rebellion, of which not 3 per cent. are Irish. These lie chiefly in Leinster and Munster. Eastern Ulster, which had been well settled before, was not much affected by this new colonization.

A little later than this, in the time of Charles II., we had a slight infusion of French blood into the country in the Huguenot refugees who settled here; some established themselves in this neighbourhood, some in the neighbourhood of Waterford, some at Portarlinton, and elsewhere, and devoted themselves to useful industries. The most of their names are still to be found near the localities in which they settled. In the south, we have still Perrin, Tabuteau, Chenevix, Laboulee, Gervais, Delamaindre, Dubay, Devignolles, Fleury, Denis, Blanche, de Maison; and in the north—Saumarez, Dubordieu, Crommelin, Delacherois, Saurin, Bulmer (now Boomer), Goyer, &c.

The next influence brought to bear on Ireland was in the invasion of William III. Estates were confiscated very liberally after the subjugation of the kingdom, and as liberally granted to William's officers—the Earl of Athlone, de Ginkel; and the Earl of Albemarle, de Joost Keppel, two commanders under William, obtained large grants. In the neighbourhood of Limerick we have still Vandeleurs, Van der Kistes, &c., who probably obtained the lands of some of the expatriated chiefs at the memorable capitulation of the city. It would seem, however, that not many new settlers were transplanted into the confiscated estates. Since

this time there have been no unusual importations of a foreign element into Ireland. The great bulk of the people still remain Celtic, except in the north-eastern part of the island, where the Saxon element is strongly represented by the descendants of English and of Lowland Scotch settlers. The Post-Office Directories of this portion furnish the most convincing testimony to this fact in the excess of Saxon over Celtic names to be found therein. The fusion of the two races has been carried out here, perhaps, better than in any other part of the island; and it may not be too much to say that the comparatively great prosperity of the North is in the main owing to this wholesome blending of blood and interests.

On the 12th of March, Mr. ROBERT SMITH read a paper on "Darwinism" of which the following is an abstract.

The theory, that life in our planet has been progressive, that by a process termed evolution low forms of life have been gradually and slowly raised to the highest stages of development, and that man himself is no exception to the rule, is a doctrine which is rapidly gaining ground among scientific naturalists. Mr. Darwin has been its great exponent. He has devoted his whole life to the investigation and elucidation of the problems involved in its consideration, and the various books he has written prove his great capacity for dealing with so difficult and intricate a subject.

Although accepted very generally by scientific men, and by nearly all the great naturalists of Europe, his views have met with violent opposition from many of his countrymen. The reason of that opposition I believe to be, the feeling that there is something irreligious in his teachings. It seems to them, that natural selection, and accidental variation, are put in the place of God, and that it only requires the addition of spontaneous generation of the primal germs to be thoroughly atheistic. This seems to me a great mistake; and as it is one which, more than any other, prevents many from even looking at the facts and arguments which estab-

lish the high probability of Mr. Darwin's hypothesis, I shall glance at it first.

Atheism and spontaneous generation stand in the same category of self-evident absurdities. No existence, no force, can create itself. To suppose this possible, we must assume that such existence, such force, must act before it exists—a manifest absurdity. It follows, therefore, that some being, some force, must have eternally existed. It follows, also, that such being, such force, must have had the power to produce all that ever has been, all that is, and all that ever shall be, world without end. That Being is God. Mr. Darwin believes in God ; nothing that he has ever taught touches the question of the divine existence. Admitting that existence, it follows that this is God's world ; that every force, every agency, every process, that may influence or modify its living inhabitants, is included in the divine government. It follows, also, that each individual amongst us is as truly created by God as was the first living man. The expression "God breathed into his nostrils the breath of life, and man became a living soul," may be said as truly of the infant born into the world at the present hour, as of that far distant event when the virgin forests first echoed the sound of a human voice.

Here we have common ground. The believer and the disbeliever in the doctrine of evolution are agreed that God is the creator of all living beings. The question then simply resolves itself into the *manner* of that creation. The believer in evolution thinks that there are indications to be gathered from the great book of nature, from the history of the globe, from a careful comparison of the organic beings that people it now, and that have successively peopled it in long past ages, to give us a faint idea of that manner. The unbeliever says there are none. The believer thinks he can detect in the way God deals with His creatures now, the great laws that have acted all through the past in modifying and building up the living forms we see around us, ourselves included ; and he thinks, also, that these great laws, or rather those modes of operation, are sufficient to account for all. God's method being the same all through the past, the same now to-day and

for ever, without variableness or shadow of turning. The unbeliever denies all this ; he sees no laws, no indications that reveal the methods of creation. He believes that although at present God may work by natural laws, *i.e.*, constant methods, He has not always done so. That He has worked by miracle—that is, by a method opposed to all His present modes of working. That every new species has been created by a miracle. That there has been no gradual modification of living forms to suit the changing conditions of existence, but that when these conditions became unfavourable, God first destroyed all the forms in existence, and then by a miraculous act created new ones better adapted to the new conditions. In the long history of the past this process must have been often repeated, for Palæontology reveals vast changes in the forms of life. Are there, then, any indications of the plan or method of creation? What are the facts supplied by the study of Embryology, that is, the creation of the individual? Dr. Carpenter, in his Comparative Physiology, gives the following summary :—"Every living being commences as a simple cell, the evolution of the germ begins by the duplicative multiplication of this cell—precisely what takes place with the simplest protophyta or protozoa. Not till this process has proceeded to a considerable extent, could it be determined, from inspection of the germ alone, whether it is that of a plant or animal. At the time when this distinction can be made, when we can say that it is the germ of an animal, we cannot determine whether it belongs to the radiated, the molluscous, articulated, or vertebrated sub-kingdom. The special character which determines this being evolved at a later period. When this can be determined, though we may be able to say it belongs to the vertebrate class, there is as yet nothing to determine whether it may be a fish, a reptile, a bird, or a mammal. When the distinctive characters of the class can be made out, there is yet nothing to determine the order ; these come next, then the family ; and so on, as we rise in the scale, the highest character coming last." Von Baer, the great German naturalist, pointed out the steps in the process of development. Comparative anatomists have shown that each step in the development of the higher animal is the permanent form of some

animal now existing. This is especially evident when we compare particular organs. Thus, the heart is at first a simple sac, formed from a mass of cells by the breaking down of the interior ones, and so forming a tube, the permanent condition of the heart in the higher radiata, and in the lower articulata and mollusca; as development proceeds, the one cell becomes divided into two, an auricle and ventricle; the stage is then reached which occurs in passing from the tunicata to the higher mollusca. The next stage seems to me the most remarkable of all, and totally inexplicable on any other theory than that of descent with gradual modification and improvement. The embryo has then reached the stage of the fish. Now fishes are aquatic animals, and their respiratory organs are totally different from the organs of those that breathe air. Gills or branchiæ occupy slits in the neck, over which the water flows, so that the blood may obtain the oxygen it requires. Man is an air-breathing animal, yet in the human embryo, at this stage of development, slits appear in the neck, with the branchial arches of rudimentary gills. As the process goes on, some of these arched blood-vessels disappear, others are changed into the vessels that supply the rudimentary lungs, the head, and the arms.

The lungs of air-inhaling animals are homologous with the swim bladder of fishes. In the sauroid family of fishes, now represented by the Lepidosteus and Polypterus, some of the branchial arches send prolongations into the swim bladder. As we rise from the amphibious to the higher reptiles, the lungs become more developed, and we have a heart with three chambers. Through this stage, also, the mammalian embryo passes; the four-chambered heart of a mammal being only fully completed at the moment when the valve of the foramen ovale closes with the first aerial inspiration. What is true of the heart is also true of the other great organs.—The nervous tissues, the brain, and spinal cord, follow the same law. The comparative anatomist can point out the gradual modification of these organs through a similar series of changes. The brain of the fish is so like to that of the human embryo in its early stages, that the one is indistinguishable from the other. Its changes of form represent successively the permanent forms in the reptile,

the bird, and the lower mammals. The change of form which marks the rise from the birds to the marsupials, from these again to the lowest placental, the rodentia; from these to the ruminants, the carnivora, the quadrumana. Every change in the position and size of the parts, as we rise in the scale, is represented in the process of development. In the development of the brain, the different members of the quadrumana exhibit vast differences. According to the high authority of Professor Huxley, the gap between the highest and the lowest of the group is greater than that which separates the highest ape from the lowest man.

Let us now glance at the record of past life as exhibited in the great series of stratified rocks. Imperfect as is the geological record of past life, rare though the conditions be, which admit of the preservation of organic remains, yet we discover in the imperfect and broken fragments, the evidence of the one great law, the advance of life. In the great Canadian series of rocks, which is the earliest known to contain the remains of life, is found the Eozoon, a member of the lowest class of living forms. In the Cambrian series, the highest known remains are those of annelids and polychaeta. The highest of the Cambro-Silurian group are cephalopods and crustaceans. In the upper Silurian we reach the stage of fishes, we have then representatives of the five sub-kingdoms, the protozoa, cœlenterata, mollusca, annulosa, and vertebrata. In the Carboniferous groups we first discover the remains of reptiles, these have only been found on the continents of Europe and America, none having yet been found in the British Isles. Reptiles of various kinds abound in the Triassic epoch. Labyrinthodonts in bony structure resembling modern batrachians, but containing characters found in lizards, crocodiles, and ganoid fishes. The foot-steps of what appear to have been birds appear on the sandstones of Connecticut, North America; and at Frome, in Somerset, some small mammalian teeth have been found, which Professor Owen thinks have belonged to some small marsupial insectivorous animal resembling the *Myrmecobius* of Australia. The Oolite period was rich in reptile forms, some of them seeming to supply the link between the reptile and the bird; mammalian remains also occur.

In the Stonesfield slate the *Stereognathus* was found, which Professor Owen believed to have been a placental mammal, hoofed and herbivorous.

The Cretaceous period is marked by the introduction of the *Teleostia*, which includes most of our existing fishes, as the cod, salmon, perch. What mammalian forms existed have not yet been found preserved.

The Tertiaries are marked by an abundance of mammalian forms, some of which in the Eocene seem to connect the rhinoceros, horse, and tapir. The highest form yet found was the ape, *Macacus Eocænus*.

In the Miocene two forms of ape are found, *Pliopithecus antiquus* and *Dryopithecus Fontani*. In the Pleistocene period we have the remains of man. Here we have noted only the highest forms of each great period of the world's history. That history involves a period of time so immense that the mind utterly fails to grasp it. Thousands of forms appeared, and disappeared never to return again, but the highest of each great period has advanced. The highest forms are the most recent.

We have seen that the human embryo, from its commencement as a simple cell to its final attainment of the rank of man, passes through a similar course of development. In that course there is one feature totally unlike all human methods of construction. It is as if a mechanic sat down to make a first-class steam engine; but instead of planning out the perfect form and constructing it, each part directly formed for its final result, he commenced by making the first engine ever constructed; then improving it slightly so as to represent the second stage of the invention, pulling old parts asunder and using up the old materials, vigorously following the historical course of improvement, omitting no important modification that had ever been made, till the final result was attained. Why is this? The disbeliever in evolution has no answer. Mr. Darwin, following the course of thought suggested by thinkers who have gone before him, but far outstripping them in the amount of his contribution, suggests the only answer possible. He replies, that the long line of living forms that have suc-

cessively peopled the earth, from the lowest to the highest, are continuous ; as generation followed generation improvements have been effected ; these being inherited, other improvements have been made, these also have become inherited, till the sum of attainment of the present has been reached. As development proceeded each improvement has been inherited at an earlier age, so that at length the improvements, which it took millions of years to accomplish, are sketched in nine months, fully carried out in from 20 to 30 years. That this is the true theory of life how many indications there are ! It happens that the materials of earlier structures have not yet been used up ; witness the remnant of the fish in the vertebræ which form the coccyx in man—the tail of the fish not yet obliterated. Are not the bones of the arm and hand of man the same bones that form the pectoral fin of the fish, the wing of the bird, the paddle of the dolphin, the fore leg of the deer, horse, dog, &c. ? The opponent to the doctrine of evolution has nothing to say to all this, he replies, God created species. 'But this is admitted on both sides. It comes to this, then, that the one asserts that God created species by miracle, that is by some method unknown, that we have never observed, that we cannot even conceive ; the other asserts that in the past, as in the present, God has worked by the same great method of law and order. The one asserts that an unchangeable God has changed His methods ; the other, that He is the same yesterday, to-day, and for ever.

So far our argument might have been carried before the time of Darwin. What light have his own investigations thrown on the subject ? Mr. Darwin, like Sir Charles Lyell, believes that our knowledge of the past can only be inferred from our knowledge of the present. When he visited the Galapagos islands in the *Beagle*, he was struck by the phenomena exhibited by their living inhabitants. In general appearance the fauna was American, but the specific forms were distinct. They differed in different islands of the same group, the degree of divergence being less between the forms of the different islands than that between those of the islands and the continent. He at once thought of descent with modification as the cause. He had also with his own hands dug up pieces

of armour exactly corresponding to the plates on the armadillo, but greatly larger in size, shewing at the same time the close relation and yet the difference between existing forms and those of a past age. The question then arose, whether variation to such an extent was possible, and how such variation might arise. His great work, "Animals and Plants under Domestication," reveals to us to some extent his labours to obtain a solution of this problem. To few men is given the patience, the fixity of purpose, the love of truth, which that work displays—or rather which that work records; for the book itself gives us only a faint idea of the thought and the labour involved in all the experiments and investigations which he carried on. He has amply demonstrated that variations occur in nature both in plants and animals. That man by a course of selection can accumulate these variations, till they amount to an extent of divergence that would be considered more than sufficient to establish distinct species, if the results merely were put before a competent naturalist, who did not know their history. Morphologically they are distinct, and the induced variation is often far greater than would be considered necessary to constitute distinct species, but they are fertile with each other, distinct species are said not to be so. Mr. Darwin, in his most interesting chapters on hybridism, crossing, &c., has shown that the degrees of sterility vary exceedingly. Some species are fertile when crossed; some distinct genera are even so. Infertility presents a graduated scale, often quite different, when with the same two species the sexes are changed.

Our domestic breeds of the cow, sheep, and dog, are either the products of distinct species, in which case distinct species have been fertile, or they are the descendants of one species, in which case variation has advanced to the limits of the specific, for morphologically they differ greatly. The differences produced in the descendants of the rock pigeon are so great, that they exceed those which separate the most distinct natural genera. The domestic rabbit differs from the wild immensely in size, in the bones of the head, jaws, and vertebræ. In 1418, I. Gonzales Zarco turned out from his ship on the island of Porto Santo, one of

the Azores, a female rabbit with her young. They increased enormously, but diminishing in size to half the weight of their predecessors. In 1861 specimens were brought to the Zoological Gardens, London, and though many attempts were made to cross them with others, the attempts failed, indicating that in this case the change had reached the limit of sterility. In the case of plants he gives abundant instances of variation; variation by seed, and bud variation. The moss rose was produced from a common rose by bud variation. New varieties of the gooseberry have been formed in the same way. By bud variation the nectarine has been produced from the peach. Cabbages, peas, beans, flowers of all kinds, are constantly yielding new varieties; the flowers of the present day have reached a perfection totally unknown to our predecessors. With animals, strongly-marked varieties have occurred. The short-legged Ancon sheep of Massachusetts—the Manchamp merino breed of sheep—shown at the 1861 Exhibition, was obtained from a ram descended from the ordinary sheep. The proceedings of the Zoological Society for 1860 report the appearance of a new variety of the peacock, which appeared suddenly in a flock of the common kinds belonging to Lord Brownlow. In some cases the new variety has been preserved by human selection; in other cases the new breed has increased to the extinction of the others. To the question, how, without human selection, new varieties can be preserved in nature, Mr. Darwin gives a most important answer. He shows that there is such a thing as natural selection, more potent, more effectual, than man's selection; that can act on all points, at all ages, on invisible as well as visible characters. It arises from the struggle for existence, consequent on the fact that the reproductive power of animals tends to act in a geometrical ratio. If limited in area, in food, or through the attacks of other animals, the weakest will perish; the strongest survive. If the conditions of life change, any slight variation which gives to an individual an advantage in the struggle, will increase his chance of living and of having progeny. The offspring that inherit the advantage will survive, and thus the improvement will be gained by all the living descendants; the less improved perishing in a greater ratio than

the other. That there is such a law as natural selection has only to be expressed to be admitted; the fittest must always have the best chance of surviving. The various qualities which may thus be increased and rendered permanent, in a race, will vary as the circumstances. Thus, in the case of an herbivorous animal kept in check by carnivora, fleetness may be an advantage; the most rapid of flight will escape, the slower will be devoured. Increased fleetness will be the result. Strength may give the law—the law of battle may determine—thus strength will be increased. Social animals may join in giving battle to an enemy, the stragglers will perish; thus the love of society, of companionship, will increase. The qualities that lead to social life will be developed. It may be that an enemy attacks the young only; in this case the existence of the race may depend on the strength of the paternal feeling. Only the parents whose devotion is greatest will be able to rear their offspring. It is obvious that this great law of natural selection may act in any direction. It will, however, always act for the benefit of the possessor of the organ or quality which is being changed. In low forms it may act on colour, by making the individual less conspicuous. It may even act as a degrading agency, if by rendering a given species more simple, or capable of living on a different kind of food, it enables it to exist when otherwise it might become extinct. With the highest race in any given area, its action must always be in the direction of improvement. With a being such as man is, and has been, so unprotected by offensive or defensive weapons, the direction of its force *must* lie in the improvement of his intellectual and moral powers. Only by the exercise of these qualities can he cope with the difficulties and dangers of his position: only by these can he adapt himself to the various climates of the world: only by these can he select the vegetable and animal organisms most suited to his use for food, for clothing, for shelter: only by the exercise of these can he unite with his fellows and form those unions called nations, kingdoms, republics. It is only the development of the moral element that can give to these the cohesion and solidarity necessary to success in the struggle for existence. That struggle still goes on.

Natural selection is at work as powerfully now as it was in the very dawn of life. Thus, in the late great war between two of the most advanced nations of Europe, it was the moral and intellectual qualities of the conquerors, as much as superiority in strength and courage, that gave them the victory. Want of honesty, want of intelligent preparation, want of skill, of prudence, of foresight, in the commanders, more than want of valour in the men, lay at the root of the defeat of the conquered.

Not alone on the battle-field does natural selection work. In the city, in the workshop, in the counting-house, it does its work silently but surely. The discovery of alcohol, and of its influence on the brain and nervous system of man, has supplied natural selection with a new element to work with in the improvement of the race. Some savage races are sinking before it, faster than they could have done before the bayonets of their more improved fellow men. Amongst ourselves, those who, like these savage races, are deficient in the power of controlling their appetites, who become victims of dipsomania, are being set aside by natural selection as unfit to be progenitors of the future race. They drop around us like the withered leaves of autumn. True, they are not all removed at an early age: some become fathers and mothers, but natural selection repeats its task with the children. Has it not decreed that the men and women of the future must be sober?

Our sedentary occupations, our want of open-air exercise for the young during the period of development, has the effect of diminishing the size of the chest and lungs; natural selection, by means of phthisis, removes the victims from among us. The respiratory organs of the coming race must be sound. Natural selection, as Mr. Darwin has so ably shown, is continually at work. Far more potent than human selection, it can act on organs man never sees, whose existence he may not even dream of, and it acts on the organism at all periods, from the development of the germ to the end of life.

We see that variation exists; we see there is natural selection. The only other element wanted is time. We know that it is possible that the child may surpass the parent. Natural selection can

accumulate improvements. Give us time enough, then, and the synthesis is complete. We have the agencies competent to develop the human race from the primal germ. Geologists have been accustomed to draw on the bank of time to an unlimited amount. Sir Charles Lyell has, however, by measurements of the delta of the Rhone, made some estimates which show how great is the lapse of time even in what may be called modern periods. When we consider the extreme slowness of a deep-sea deposit, and look at the masses of such deposits, we know that the lapse of time since the dawn of life on our planet has been enormous. Sir William Thomson tells us, however, that there is a limit. He concludes that the consolidation of the earth's crust can hardly have occurred less than 20 or more than 200 million years ago. As Mr. Darwin remarks, the wideness of the limits shows how doubtful the data are. Professor Huxley takes up the same question. He says, "Before we can be accused of running counter to the principles of Natural Philosophy, it must be shown that the limits assigned by Sir William are really insufficient for the purpose of the evolutionist. That is, are we really contravening the conclusions of Natural Philosophy? And secondly, if we are, are those conclusions so firmly based that we may not contravene them?" Professor Huxley replies in the negative to both these questions. He says, "If it be said that it is Biology, and not Geology, that asks for so much time—that the succession of life demands vast intervals—but this appears to me to be reasoning in a circle. Biology takes its time from Geology. The only reason we have for believing in the slow rate of the change in living forms, is the fact that they persist through a series of deposits which, Geology informs us, took a long time to make. If the geological clock is wrong, all the naturalist will have to do is to modify his notions of the rapidity of change accordingly. And I venture to point out, when we are told that the limitation of the period during which living beings have inhabited this planet to one, two, or three hundred million years, requires a complete revolution in geological speculation—the *onus probandi* rests on the maker of the assertion, who brings forward not a shadow of evidence in its support.

Thus, if we accept the limitation of time placed before us by Sir William Thomson, it is not obvious, on the face of the matter, that we shall have to alter or reform our ways in any appreciable degree, and we may therefore proceed with much calmness, and, indeed, much indifference as to the result, to enquire whether that limitation is justified by the argument employed in its support." He then proceeds to investigate the arguments employed by Sir William, and the data on which they are founded, and shows that they are extremely doubtful. He has the following passage:—"Mathematics may be compared to a mill of exquisite workmanship, which grinds you stuff of any degree of fineness; but nevertheless, what you get out depends on what you put in: and as the grandest mill in the world will not extract wheat-flour from peas-cods, so pages of formula will not get a definite result out of loose data." Variation! natural selection! time! these are the elements with which the Eternal has worked all through the mighty past. The first is the most important, as it is the most mysterious. On it depends all the rest. Without variation, natural selection and time could only repeat the past. Variability is inherited. A living form that has persisted long in one condition, by that very persistence is less likely to vary in the future. One which has changed is more likely to change again. Hence, the highest organisms are the most variable, for in the past they have varied most. How rapid are the changes with the mammals of the Tertiary epoch! Man is probably the most variable of all. Mr. Darwin quotes from papers by Mr. J. Wood, published in the proceedings of the Royal Society, showing the extent of muscular variation in man. In a single male subject, having a strong bodily frame and well-formed skull, he found no less than seven muscular variations, all of which plainly represented muscles proper to various kinds of apes. Mr. Wood regards these variations as indicating some unknown factor of much importance to a knowledge of general and scientific anatomy. That unknown factor Mr. Darwin regards as reversion to the form of some remote progenitor. That human beings vary much is known to every father and mother of a family. No two children are exactly alike in form, in disposition, or in capacity.

In this element we have seen, we have the basis of progression. Progression in the past being thus the result of natural and necessary laws, must be perennial. The future of our race is thus assured. We are relieved from the misgiving, the dread, lest the world is getting worse, mankind becoming more wicked and depraved—a nightmare that haunts the minds of very many good people, but which is totally irreconcilable with the belief in the wisdom and goodness of the Eternal.





NOTICE.

EXCHANGE OF PROCEEDINGS.

THE Committee of the Club have been desirous of establishing a yearly exchange of their published proceedings with those of kindred organizations in other places, and have, during the past year, forwarded copies of their Ninth Annual Report to other societies. They acknowledge with thanks the receipt of the following publications, and hope that other societies, whose objects are similar, will favour them with copies of their proceedings as published :—

Bath Natural History and Antiquarian Field Club.

Proceedings. Vol. II., Part 3.—1872.

Botanical Society of Edinburgh.

Transactions. Vol. I.—1844.

Do. Vol. II., Part 3.—1846.

Do. Vol. III.—1850.

Do. Vol. IV.—1853.

Do. Vol. V.—1858.

Transactions and Proceedings. Vol. II., Part 2.—1873.

Brighton and Sussex Natural History Society.

Nineteenth Annual Report and Abstract of Proceedings.—1873.

Bristol Naturalists' Society.

Proceedings, January to May, 1872.

List of Officers, Members, &c,

Canadian Institute.

Canadian Journal of Science, Literature, and History. Vol. XIII.
Part 5.—1872.

Cardiff Naturalists' Society.

Report and Transactions. Vol. III., Part 1.—1872.

Essex Institute, Salem, Mass., U.S.A.

Historical Notice of Essex Institute.—1866.

Memoir of Francis Peabody.—1868.

Proceedings of Essex Institute. Vol. VI.—1870.

Communications of Essex Institute. Vol. VI.—1871.

Bulletin of Essex Institute. Vol I.—1870.

Geologists' Association (London).

Proceedings. Vol I.—1871-2.

Do. Vol. II., Part 1.—1873.

Annual Report for 1871.

Do. 1872.

Geological Society of Edinburgh.

Transactions. Vol. II., Part 1.—1872.

Geological Survey of Ireland.

Geological Report on Londonderry and parts of Tyrone and Fermanagh,
by Lieut.-Col. Portlock.

List of Papers published on the Geology of North of Ireland and adjoining districts, arranged by E. S. Hardman, F.R.G.S.I.

Memoirs Explanatory of Sheets Nos. 36, 48, 49, 50, and 61 of the Maps
of the Survey.—1871-72.

Leeds Philosophical and Literary Society.

Annual Report, 1871-72.

Liverpool Geological Society.

Abstract of Proceedings, 1871-72.

Liverpool Naturalists' Field Club.

Annual Report, 1871-72.

Manchester Naturalists' Field Club.

Annual Report, 1871.

Natural History Club of Philadelphia.

Address read at First Annual Meeting.—1868.

Address read at Second Annual Meeting.—1869.

Third Annual Report.—1871.

Fourth Annual Report.—1872.

Fifth Annual Report.—1873.

Norfolk and Norwich Naturalists' Society.

Transactions, 1871-2.

Plymouth Institution.

Transactions. Vol. IV., Part 3.—1872.

Perthshire Society of Natural Science.

Fauna Perthensis. Part I, Lepidoptera.—1871.

Smithsonian Institution, Washington, U.S.A.

Annual Report of Board of Regents for 1870.

Warwickshire Natural History and Archæological Society.

Thirty-second Annual Report.—1868.

Thirty-third Annual Report.—1869.

Thirty-fourth Annual Report.—1870.

Thirty-fifth Annual Report.—1871.

Thirty-sixth Annual Report.—1872.

Warwickshire Naturalists' and Archæologists' Field Club.

Proceedings for 1871.

[*From the respective Societies.*]

On certain Wingless Insects, by T. W. Wonfer, Brighton.

On the Glaciation of Iar Connaught, by G. H. Kinahan and M. H. Close, Dublin.

[*From the Authors.*]

Scottish Naturalist. Vol. I., Part 8.—1872.

[*From the Editor, Dr. F. Buchanan White, Dunkeld.*]





ANNUAL CONVERSAZIONE.

THE following is an account of the ANNUAL CONVERSAZIONE, held in the MUSEUM, on WEDNESDAY, 23rd April :—

(Extract from Local Papers.)

THIS thriving and vigorous young society, of which Belfast may well feel proud, recently held their Annual Meeting, at which the very satisfactory report for the past season was read, and arrangements for the ensuing season decided upon. The Annual Conversazione of the Society, preparatory to the opening of the summer season, was held on Wednesday evening, in the Belfast Museum, College Square. These very agreeable scientific reunions are held chiefly for the purpose of affording an opportunity for the members as well as the friends of the Society to meet together for the purpose of discussing, in conversational style, the various subjects which have occupied the attention and investigation of the members of the Club during the previous season. Although on such occasions all matters having any connexion with the interests of the Society are embraced, yet these meetings have special reference to the subjects which have come under the attention of the Club during the winter's proceedings. These conversazioni are nominally confined to the members of the Club, and this imparts to them somewhat of a private character; but there is usually such an addition of select, cultivated guests, as to render the occasion agreeably free and informal. More diversity of tastes and opinions are introduced, and, as a consequence, the conversation and comments are more

varied and suggestive. Of this description was the meeting on Wednesday evening last. There was not only a full attendance of members, but a large number of visitors also. As regarded the attendance, it was admirable to observe the success with which the organisers combined variety and selectness—those two essentials for a genuinely enjoyable evening party. There was, perhaps, a slight drawback in the limited accommodation afforded by the exhibition-room ; one required constantly to be on the alert to avoid standing on the ladies' trains. The deficiency in this respect, however, was to a great extent caused by the large amount of space allocated to the varied and numerous collection of articles displayed, including some choice and rare specimens from the three kingdoms of nature—the mineral, the vegetable, and the animal. The business commenced at eight o'clock, and closed at eleven, and during the entire interval all present manifested unabating interest and enjoyment in the entertainment. The old Museum building presented the appearance on entrance of having been transformed into a private mansion ; and the completeness of the metamorphose, as well as of the other arrangements, reflected most creditably on the taste, skill, and care of the Managing Committee, Dr. Moore, and Messrs. Knight, Swanston, Lockwood, Robinson, and Gray, who embellished the interior of the building in an ornamental and chastely artistic style with flags, evergreens, and flowers. The wreaths, festoons, and emblematic devices, formed from the flowers and evergreens, were peculiarly appropriate and attractive. Nor should the effective assistance in the decorative embellishments of the occasion rendered to the committee by the experience and skill of Mr. Darragh, the Curator of the Museum, be omitted. The large room on the first floor of the building was the principal source of attraction. At one end of the room a large group was formed, having illustrative reference chiefly to the paper on Darwinism read before the Club on a previous occasion by Mr. Robert Smith. At the base was shown the lower animal forms, such as sponges, corals, and star-fishes. Above them were ranged specimens of the several mollusc tribes, such as slugs, oysters, and cuttlefish. Next came the worms, crabs, lobsters,

butterflies. A step higher, fishes were represented ; and above these were the reptiles, including frogs, lizards, and serpents. The latter department included a splendid stuffed specimen of the formidable boa constrictor, coiled up in concentric rolls, with the head radiating from the centre fold like the axle of a wheel. Above the reptiles were placed admirably-stuffed birds of various hues. Over these were ranged the mammals, represented by the deer, lion, &c. On the top, below man, was represented the monkey tribe. Thus, the animal group exhibited in its construction a complete gradation, in perfect imitation of nature, from the very simplest and most elementary forms of animal life to the highest and most complicated developments—from the zoophyte to the human species. Mr. Gray exhibited samples of coal from Ballycastle and Tyrone, and lignite from Ballintoy and the Giant's Causeway. These specimens were used in illustration of his paper on County Antrim lignite, read before the Club. He also exhibited a series of rock specimens, being a contribution for a collection of Irish rocks for the museum of the Natural History Society. Mr. Gray also contributed specimens of rock brought up by the diamond-boring apparatus from depths reaching down to 1,000 feet. The action of this wonderful borer is somewhat analogous to that of a grocer's cheese-piercer. Mr. Swanston exhibited a beautiful collection of rare ferns, for which he obtained the Club's prize. A large number of extremely interesting microscopic objects were shown by some very powerful microscopes. These were presided over by the Rev. Dr. MacIlwaine, Dr. Burden, Messrs. Anderson, Swanston, Patterson, Charley, Robinson, and Gray. Mr. Young contributed some curious specimens of early printing. Messrs. Lockwood and Doubleday exhibited some beautiful water-colour sketches ; and Dr. James Moore, H.R.H.A., a few masterly sketches, delineating, with bold power and truthfulness, the natural characteristics of rugged mountain scenery. Mr. Wright exhibited a series of fossils procured from the chalk rocks of the County Antrim, and which were similar in character to those dredged by Dr. Carpenter, the illustrious Registrar of the London University, and Dr. Wyville Thomson, from the deep sea. Mr. W. J. Knowles

exhibited some modern fabrications of ancient Irish stone and bronze implements, in illustration of his excellent paper on the County Antrim forgeries. Miss Alder, of Holywood, contributed some very pretty specimens of Venus's Basket glass sponge, Serpentine, &c. Mr. H. Robinson exhibited a large collection of photographs ; Mr. Johnston, Botanic Gardens, some skeleton leaves ; and Mr. J. J. Murphy, F.G.S., contributed a fine revolving stereoscope, with a magnificent set of slides, which formed one of the most interesting attractions in the room.

Refreshments, which were served in a room on the ground floor, were supplied by Mr. Walker, Botanic Road. A number of new members were enrolled at the close of the meeting. In speaking of the decorations, we forgot to mention that cut flowers and plants in pots were liberally contributed by several friends of the society, including Sir Thomas Bateson, Belvoir Park ; Thomas Sinclair, Esq., J.P. ; Miss Johnston, Dalriada ; John Anderson, Esq., J.P., Holywood ; Messrs. Threlkeld, Belfast, and Dickson, Belmont Nurseries ; Dr. Ritchie, J.P., The Grove ; Mr. Given, Ballymena ; and Dr. Burden, Belfast.





BELFAST NATURALISTS' FIELD CLUB.

ELEVENTH YEAR—1873-74.

LIST OF OFFICERS AND MEMBERS.

President.

JOHN ANDERSON, J.P., F.G.S.

Vice-President.

REV. WILLIAM M'ILWAINE, D.D.

Treasurer.

GREER MALCOMSON, CASTLE PLACE.

Secretaries.

WILLIAM GRAY,

MOUNT CHARLES.

HUGH ROBINSON,

DONEGALL STREET.

Committee.

HENRY KNIGHT.

F. W. LOCKWOOD.

Dr. J. MOORE, M.R.I.A., H.R.H.A.

ROBERT SMITH.

S. A. STEWART.

WILLIAM SWANSTON.

SAMUEL SYMINGTON.

JAMES WRIGHT.

JOSEPH WRIGHT, F.G.S.

R. M. YOUNG.

Members.

Any Changes in the Addresses of Members should be communicated by them to the Secretaries.

John B. Aickin, Dover street.
 William Aickin, M.D., Murray's terrace.
 Miss Alder, Holywood.
 Miss Alexander, Vicinage park.
 W. J. C. Allen, J.P., Faunoran, Whiteabbey.
 Edward Allworthy, Mountview.
 John Anderson, J.P., F.G.S., Hillbrook, Holywood.
 John Anderson, Richmond terrace
 Robert Anderson, Balmoral.
 Mrs. Andrews, Chlorine place.
 Edward N. Banks, Botanic avenue
 Jas. M. Barkley, Sydenham avenue
 William Batt, Ormeau road
 J. G. Bell, Tullylish, Gilford, County Down.
 J. M'D. Bermingham, A.R.I.A.I., Mount Charles.
 Arthur Black, New road, Ballymacarrett.
 W. J. Boucher, Landscape terrace
 W. H. Braddell, St. Ives, Malone park.
 Edward Braddell, St. Ives, Malone park.
 Rev. S. A. Brenan, A.B., Pomeroy, Co. Tyrone.
 Chas. H. Brett, Dunedin terrace.
 John Browne, Crumlin road
 James Bryce, A.M., LL.D., F.G.S., F.R.G.S.I., Bowe's hill, Blantyre, Glasgow. (Hon. Mem.)
 Henry Burden, M.D., Prospect, Ballynafeigh.
 Jas. Calwell, Cushendun, County Antrim.
 Jno. Campbell, Mossley, Carnmoney
 Miss Carruthers, Claremont street.
 John Charley, College park.
 J. C. Clarke, Cliftonville.
 William Clibborn, Windsor terrace.
 Sir Edward Coey, J.P., D.L., Merville, Whiteabbey.
 John Collins, Nottinghill, Malone
 Miss Connery, Victoria place

W. F. C. S. Corry, Mountpottinger.
 W. D. Cramp, Mount Charles.
 Jno. Cramsie, Lisavour, Strandtown.
 Jno. Cramsie, jun., Lisavour, Strandtown.
 Alexander Crawford, Fitzwilliam st.
 Wm. Crawford, jun., Fitzroy avenue.
 Henry C. Cronhelm, Donegall st.
 Edward Dale, Fitzroy avenue.
 Jno. H. Davies, Glenmore, Lisburn.
 Robert Day, F.S.A., Patrick street, Cork.
 G. Donaldson, Mount Collyer park.
 Wm. Doubleday, College sq. North.
 Wm. Duff, Lancaster street.
 John Eagleson, Brandon Towers, Sydenham.
 J. R. Edeson, Mount Charles.
 Mrs. Edeson, Mount Charles.
 William Edgar, Lincoln avenue.
 M. Fitzpatrick, Oberon, Ballynafeigh
 William J. Gilmore, Cliftonville.
 G. G. Glover, Kew cottages, Mountpottinger.
 Ernest H. Goold, Donegall street.
 Jas. Gourlay, Kilinchy, Co. Down.
 Rev. John Grainger, A.M., D.D., Broughshane, County Antrim. (Cor. Mem.)
 Rev. James Graves, A.B., Stoneyford, County Kilkenny. (Cor. Mem.)
 William Gray, A.R.I.A.I., Mount Charles.
 Forster Green, Derryvolgie, Malone
 Henry Green, Derryvolgie, Malone.
 Henry Greenhill, Balmoral.
 Mrs. Greenhill, Balmoral.
 Miss Greer, Tarbat villa, Sydenham.
 Jas. C. Greer, Annadale.
 Mrs. Greer, Annadale.
 Wm. Gregg, Willowbank.
 Wm. Greig, Richmond.
 Hugh Hamilton, University square,
 Wm. Hancock, Manorhouse, Lurgan
 William Harte, C.E. (Cor. Mem.), Buncrana, Co. Donegal.

Wm. Harvey, Kinnaird street.
 Jas. Haslett, Franklin place.
 W. B. Haynes, Lincoln villa, Knock.
 W. D. Henderson, University sq.
 James Hewitt, Ballymacreely, Killylinchy, Co. Down.
 Stephen Hicklin, Ligonell.
 Prof. J. F. Hodges, M.D., Windsor.
 John Hogg, Richmond terrace.
 J. Sinclair Holden, M.D., Sudbury, Suffolk. (Cor. Mem.)
 George Horner, Cliftonville.
 Alex. Hunter, Cromac street.
 Thos. Hunter, Holywood.
 H. H. Jamieson, Casaeldono, Castlereagh.
 F. M. Jennings, Cork. (Hon. Mem.)
 Miss Johnston, Dalriada, Whiteabbey.
 Miss Johnston, Glenavy, Co. Antrim
 Jas. Johnston, Alma terrace.
 Saml. Johnston, Antrim road.
 W. J. Johnston, Dunesk, Stranmillis
 J. F. Johnstone, Royal Botanic Gardens.
 R. S. Joyce, Mountpottinger.
 W. Thompson Kelly, Regent st.
 Mrs. Keogh, Crumlin road.
 T. Heron Keown, M.D., R.N., Dundela, Strandtown.
 Wm. Kernahan, Sydenham.
 Wm. King, Mountpleasant, Stranmillis.
 Henry Knight, Clifton park avenue.
 W. J. Knowles, Cullybackey, Co. Antrim.
 Miss Lamb, Divis view.
 W. W. Lamb, Divis view.
 George Langtry, Mount Charles.
 G. D. Leatham, Malone park.
 F. R. Lepper, Sydenham.
 Miss Lester, Lonsdale street.
 F. W. Lockwood, Old Lodge road.
 John Love, Oldpark terrace.
 Wm. Lowry, Kinkora, Belmont.
 Henry Major, Lisburn.
 Greer Malcomson, Shamrock lodge.
 James Malcomson, Mountpottinger.
 Mrs. Malcomson, Mountpottinger.
 John Marsh, York street.
 Joseph C. Marsh, Donegall street.
 Rev. Jas. Martin, Eglintoun, Antrim road.
 Mrs. Martin, Eglintoun, Antrim rd.

John Martin, M.D., Clarence place.
 P. C. Mayne, Sydenham
 John Millar, Lisburn.
 Miss Millar, Lisburn.
 William Millar, Durham street
 Jno. K. Mitchell, Hazlebank, Knock
 James Moore, M.D., M.R.I.A., H.R.H.A., Chichester street.
 John Moore, M.D., Carlisle terrace.
 W. R. Molyneux, Florence place.
 Miss Monteith, Claremont street.
 William Morris, Eton terrace.
 Hugh Morrison, Ardoyne.
 Rev. W. E. Mulgan, A.B., Dunmurry Rector, Clough, Co. Antrim.
 J. J. Murphy, F.G.S., Oldforge, Dunmurry.
 J. W. Murphy, Stranmillis.
 J. R. Musgrave, J.P., Drumglass, Malone.
 Robt. M'Adam, College square East
 James M'Blain, Clifton street.
 John M'Caw, Carlisle street.
 Jas. M'Clenahan, Ardoyne.
 Rev. G. Macloskie, A.M., LL.D., Richmond crescent.
 Miss M'Clure, Belmont.
 Thos. M'Clure, J.P., V.L., M.P., Belmont.
 Rev. Edmund M'Clure, Wellington park.
 John M'Connell, Eglinton street.
 Rev. Wm. M'Ilwaine, D.D., Ulster-ville.
 Mrs. M'Ilwaine, Ulsterville.
 Danl. M'Kee, Adela place.
 John Mackenzie, Balmoral.
 R. L. M'Kinney, Carlisle street.
 Thos. MacKnight, Balmoral terrace.
 Alex. M'Laine, Corporation street.
 Wm. M'Millan, Ballinasloe.
 Nicholas Oakman, Prospect terrace.
 George O'Brien, Holywood.
 W. D. O'Brien, Holywood.
 Alex. O'Rorke, Magdala house, Strandtown.
 David C. Patterson, Holywood.
 W. H. Patterson, Dundela, Strandtown.
 Jas. Phillips, Virginia street.
 W. H. Phillips, Lemonfield, Holywood.
 John Pim, Clifton Park avenue.
 Joshua Pim, Crumlin terrace.

Thomas W. Pim, Evelyn lodge,
Sydenham.
Angus M. Porter, M.D., College
square North.
Jno. Preston, jun., Dunmore, Antrim
road.
Alfred Purdon, Wellington place.
John Pyper, Oldpark terrace.
John Reid, Donegall square West.
Francis Ritchie, The Grove.
Miss Robinson, Lisanore, Antrim
road.
Rev. George Robinson, A.B., Tar-
taraghan, Co. Armagh.
Hugh Robinson, Donegall street.
J. F. Robinson, Woodstock road.
Ninian J. Robinson, Consbrook ter.
W. A. Robinson, Crofton, Holywood
Edward Rogan, High street.
Richard Ross, M.D., Wellington
place.
Hugh Savage, Antrim.
Rev. Geo. Brydges Sayers, A.B.,
Raloo, Carrickfergus.
Mrs. Scott, Sydenham.
Rev. Charles Scott, Elgin terrace.
J. M. Johnston Scott, M.D., Eglin-
ton place.
W. M. Scott, Eglinton place.
R. C. Sedgewick, Holywood.
Thomas Shaw, Pakenham place.
John Shelly, Whiteabbey.
William Shepherd, Holywood.
Miss Simpson, University square.
Stewart Simpson, Queen street.
George K. Smith, Whiteabbey.
Robert Smith, Hughes's buildings.
Rev. George C. Smythe, A.M.,
Carnmoney.
Thomas Smyth, Kensington street.
Adam Speers, Holywood.
J. H. Staples, Lissan, Co. Tyrone.
Robert Stewart, M.D., Falls road.
S. A. Stewart, North street.
Miss Swanston, University street.
Wm. Swanston, University street.
Saml. Symington, Brookfield house.
Ralph Tate, A.L.S., F.G.S., Red-
car, Yorkshire. (Hon. Mem.)
A. O'D. Taylor, Upper crescent.
Prof. Wyville Thomson, LL.D.,
F.R.S., F.G.S., &c., Univer-
sity, Edinburgh. (Hon. Mem.)

Prof. Jas. Thompson, A.M., LL.D.,
C.E., University, Glasgow.
(Hon. Mem.)
Mrs. Thomson, Glasgow.
Miss Thomson, Glasgow.
Geo. Thomson, Grosvenor street.
Henry Thompson, Windsor.
W. G. W. Thompson, M.D., Bally-
money.
Miss Thorn, Millbank, Holywood.
Alex. Threlkeld, Malone road.
Charles Todd, Markethill, County
Armagh.
John Todd, Regent street.
W. A. Todd, Regent street.
Robt. K. Tomlin, University square.
Joseph Totton, Dundela terrace.
William Valentine, J.P., Glenavna,
Whiteabbey.
J. W. Valentine, Fortwilliam park.
T. R. Walkington, Laurel lodge,
Sydenham.
John S. Ward, Lisburn.
W. R. Ward, Nea house, Christ-
church, Hants.
W. T. Watters, Sydenham avenue.
W. Watson, Londonderry. (Cor.
Mem.)
Alex. C. Welsh, Dromore, Co.
Down. (Cor. Mem.)
T. K. Wheeler, M.D., Clarendon
place.
T. K. Wheeler, - jun., Clarendon
place.
David Wilson, Ballymoney.
Jas. Wilson, Jun., Albion place.
Jas. Wilson, Ballybundon, Killinchy,
Co. Down.
John Workman, Windsor.
Rev. Robt. Workman, A.M., Glas-
try, Kirkcubbin, Co. Down.
Thos. Workman, Windsor.
H. J. Wright, Lonsdale street.
Jas. Wright, College green.
Joseph Wright, F.G.S., F.R.G.S.I.,
Kinnaird street.
Saml. O. Wylie, College square N.
Wm. Wylie, College square North.
Robert Young, C.E., Richmond.
Robert M. Young, Richmond.
Samuel Young, Roselands, Falls
road.



RULES

OF THE

Belfast Naturalists' Field Club.



I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the object of the Society be the practical Study of Natural Science and Archæology.

III.

That the Club shall consist of Honorary, Corresponding, and Ordinary Members. The Ordinary Members to pay annually a Subscription of Five Shillings; and that Corresponding Members be expected to communicate a paper within every two years.

IV.

That Candidates shall be proposed and seconded at any meeting of the Club by Members present, and then be elected by a majority of votes.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, two Secretaries, and ten Members, who form the Committee. Five to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of the district. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collection of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable; provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.

XI.

That the Committee be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to Members of kindred Societies, on similar privileges being accorded to its Members by such other Societies.

The following Rules for the conducting of the Excursions have been arranged by the Committee.



I.—The Excursion to be open to all Members ; each one to have the privilege of introducing two friends.

II.—A Chairman to be elected as at ordinary meetings.

III.—One of the Secretaries to act as conductor, or in the absence of both, a Member to be elected for that purpose.

IV.—No change to be made in the programme, or extra expenses incurred, except by the consent of the majority of the Members present.

V.—No fees, gratuities, or other expenses, to be paid except through the conductor.

VI.—Every Member or Visitor to have the accommodation assigned by the conductor. Where accommodation is limited, consideration will be given to priority of application.

VII.—Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII.—Those who attend an excursion without previous notice will be liable to extra charge, if extra cost be incurred thereby.

IX.—No intoxicating liquors to be provided at the expense of the Club.





Belfast Naturalists' Field Club.

ELEVENTH YEAR.

THE Committee offer the following Prizes to be competed for during the Session ending March 31, 1874:—

I.	For the best Herbarium of Flowering Plants, representing not less than 250 Species.....	£1	0	0
II.	For the best Herbarium of Flowering Plants, representing not less than 150 Species.....	0	10	0
III.	For the best Collection of Mosses.....	0	10	0
IV.	„ best do. Seaweeds	0	10	0
V.	„ best do. Ferns.....	0	5	0
VI.	Best Collection of Cretaceous Fossils.....	0	10	0
VII.	Do. Liassic do.....	0	10	0
VIII.	Do. Palæozoic do.....	0	10	0
IX.	Do. Marine Shells.....	0	10	0
X.	Do. Land and Fresh-water Shells	0	10	0
XI.	Do. Coleoptera & Lepidoptera.	0	10	0
XII.	Best Set of 25 Microscopic Slides.....	0	10	0
XIII.	Best Collection Archæological Objects.....	0	10	0
XIV.	Do. Crustacea.....	0	10	0
XV.	Do. Echinodermata.....	0	10	0
XVI.	Best Collection of all or any of the above objects collected <i>at the Excursions</i> of the Year	0	10	0

- XVII. Six best Field Sketches appertaining to Geology,
Archæology, or Natural History.....£0 10 0

In every case where three or more persons compete for a Prize, a second one, of half its value, will be awarded, if the conditions are otherwise complied with.

CONDITIONS.

No Competitor to obtain more than Two Prizes in any one year.

No Competitor to be awarded the same Prize twice within three years.

All Collections to be made personally during the Session, within the Province of Ulster. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in flower, and classified according to the natural system. The Sketches, Drawings, and Microscopic Slides to be the Competitors' own work.

No Prizes shall be awarded except to such Collections as shall, in the opinions of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful Competitor.

SPECIAL PRIZES.

- XVIII. The President (Mr. John Anderson, F.G.S.), offers a Prize of £1 1s. for the best Original Measured Drawing and details of some Ruined Building in Ireland, of not later date than the fifteenth century. The building selected to be different from that for which the Prize was previously given. The Prize Drawings to become the property of the Club.

- XIX. Mr. J. W. Murphy offers a Prize of 10s. for the best Collection of Recent Sponges—the conditions being the same as those for Prizes I. to XVII.

Presented.
11 FEB 1886



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